

# COAL AGE

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It is a saying of one of the richest men in America, the head of a great industrial corporation, that:

*"A Friendship founded on Business is a good deal better than a Business founded on Friendship."*

Most concerns have learned the value of service; that is, following up the goods sold to see that the customer is not only satisfied with his purchase, but that whatever is necessary in the way of advice as to the best use and operation of the articles bought, together with all essential repair parts, etc., is constantly and easily obtainable.

That is SERVICE and it makes friends as the result of good business.

A good many coal-mining companies nowadays are making SERVICE an integral part of their operations by doing "Welfare Work" which consists of service to employees through making living conditions in mine camps and towns more desirable by reason of proper housing, sanitation, etc. Also by making life in such camps and towns more like life should be, in the way of providing churches, schools, playgrounds, baseball and tennis grounds, moving-picture halls, etc. In fact to make a mine camp or town as attractive and desirable a place to live as anywhere else.

This welfare work is good. Without doubt it is responsible for improved living conditions in many coal-mining communities. The cost of it is nearly all borne by the companies engaged in the work. Yet, welfare work still has many critics, and, strange to say, most of these are among the very employees for whose benefit such work is being done. What is the basis of this criticism and how can the companies that are honestly trying to improve conditions for their employees and families, overcome it?

The answer to the first question is that some companies are endeavoring, through welfare work, to establish a business based on friendship, which they hope to secure through this medium. The welfare work they do is played up so strong and is so much advertised, that the employee is led to believe that he is too much the ward of the company, and that after all whatever Charity—as he terms it—the corporation bestows on him in the way of welfare work, it got out of him down in the mine.

Sometimes too this is true as in the case of one model mine camp we recall, where everything on the surface from tenements, church and schoolhouse to steel tipple, was so pretty, that men on going there to seek work turned away, saying "Nothing doing—it's too d—n nice on top." Certainly that sounded like these men had been to places where the inside was neglected for the benefit of the outside.

The answer to the second question is that while criticism of welfare work will possibly never be entirely overcome, because of the instinctive belief the miner has that when you do so much of this kind of thing for him, you are striking at his independence somewhere; it can in large measure be overcome by making the welfare work a company does, as much an integral part of its operations as running pumps and motors. To persist in it through good times and bad, yet never to let it savor of Charity to the men. In other words to conduct the business so that friendship follows.

After all it is simply a matter of following the right principle, for it is next to impossible for men to be proof against good treatment when they are convinced that there is no ulterior motive. But the most lavish welfare work will finally be of no avail if the wages, conditions and treatment of men in and about the mine itself are not equally as good and even better in kind than the welfare work itself. In other words, don't do welfare work as the means to an end. If this principle governs the conduct of it, you may as well not do it.

# Problems Encountered in Kentucky Coal Mining

BY NEWELL G. ALFORD\*

**SYNOPSIS**—In the west Kentucky coal field about 66 per cent. of the coal is extracted and in some places only 44 per cent. The roofs of the beds are weak, but coal is left in mining to protect the miner. As a result of this and other care the death rate is less than one fatality for 790,000 tons. Gob fires give much trouble.

In the latest available reports of the Kentucky mine inspector and the United States Geological Survey's "Production of Coal in 1912," it is estimated that the total coal acreage of the state is approximately 16,670 square miles, of which the western Kentucky coal field embraces 38.3 per cent.; also that Kentucky's coal production in 1912 was 16,491,000 tons, 47.7 per cent. of which was produced in the western field.

This 47.7 per cent., which amounts to slightly less than 8,000,000 tons, was produced by 120 mines, operated by 98 companies. I have made a detailed classification of these 120 mines and their outputs as follows: 21 per cent. produce less than 10,000 tons; 51 per cent. produce less than 60,000 tons; 23 per cent. produce more than 100,000 tons; two companies operating 18 mines, produced  $2\frac{3}{4}$  million tons.

## COAL BEDS WORKED

The workable coal beds in the western Kentucky field, under development, are with but a few exceptions No. 9 and No. 11 as identified by the Kentucky State Geological Survey. Being more consistent in occurrence, No. 9 supplies about three-fourths of the total output of the field. This seam, which is present in eight counties, averages 5 ft. in thickness. While this bed is most generally approached by shafts 300 ft. or less in depth, there are depressions in some vicinities which make entrance possible by slope or drift.

Seam No. 11, which is from 40 to 100 ft. above No. 9, is the next bed of importance in this field. It averages 6 ft. in thickness.

## ROOM-AND-PILLAR WORKINGS

Without exception, the mines of western Kentucky are developed by the room-and-pillar method, with double or triple entries. The triple-entry system is used only in the larger mines. There the motor parting is made in the central entry; the side entries are used for mule haulage and ventilation, respectively. This not only facilitates ventilation, but permits of the motor parting being placed nearer the working rooms, thus reducing the mule haulage. This efficiency is gained, however, only at the increased cost of driving an extra entry.

Robbing pillars in No. 11 coal is particularly hazardous and impracticable because of the heavy, solid limestone roof. No. 11 coal is friable and crushing results where insufficient pillars have been left. Moreover, the pillars settle under pressure with the consequent heaving of the soft, fireclay bottom.

In some of the mines in this field, old works are used as air courses. Gases generated from gob and shale piles are absorbed and carried along by the air current.

The difficulties arising from this practice indicate that it should be avoided in all cases, for the numerous wooden brattices to be maintained make it impossible to prevent large leakages in the current. In addition to this, the friction resulting from the large rubbing surfaces encountered necessitates an increase in the horsepower of the ventilating equipment.

An instance is referred to, in the territory under discussion, where within the last few years an old mine was abandoned. The intake air was delivered by way of a long, circuitous route through old workings to the working faces. Owing to the long distance which the air had to travel, it finally reached the faces so permeated with impurities that its vitiated condition became one of the causes for the closing of the mine.

## IGNITION OF NO. 11 COAL IN OLD WORKINGS

Seams No. 9 and No. 11 with their accompanying shales and gob roof are highly charged with iron pyrites. The atmospheric oxidation of the iron pyrites in the pillars of old works accounts for the generation of much heat, slow as the process may be.

It is also believed that the energy expended in crushing pillars of insufficient size, by the overlying strata, is transformed into heat which promotes a rise in temperature.

The consequent expanding of the coal produces crevices which in turn augment oxidation. Gradually after smoking awhile the coal breaks into a smoldering fire, the boney roof ignites and falls, and this is followed by the ignition of No. 12 coal, where the intermediate stratum of limestone is absent. This last development occurs where the fire has gained sufficient headway.

The prevention of such fires presents an interesting problem, which is solved by sealing off the works liable to such chemical action; or by increasing the quantity of circulating air.

The pursuance of the first method is a popular one because it not only prevents spontaneous combustion, but avoids the impregnation of the circulating air with the gob or shale gases. Since this method can best be worked out by sealing up an entire block of old workings after their abandonment, it has created a tendency on the part of the largest operator in the field to adopt the panel system in working No. 11 coal. To brattice off the old works largely excludes the oxygen necessary to the oxidation of the iron pyrites.

The second scheme is important because conditions arise where it is impossible to follow the sealing-off method. Here the end is accomplished through reducing the temperature of the air in contact with the pillars, by increasing the quantity in circulation and thus preventing the development of heat.

## COAL DUST

In workings where there is a scarcity of mine water, the accumulation of coal dust is, in most cases, given the close attention of the various managements. In keeping

\*Assistant engineer, St. Bernard Mining Co., Earlington, Ky. Abstract of a paper presented at the winter meeting of the Kentucky Mining Institute, Dec. 8, 1913.

with the usual practice, coal dust is cleaned up at intervals and hauled from the mines. Sprinkling is also in prevalent usage in this connection. Humidification of the intake air in the winter months has been universally adopted by the larger operators.

#### SHOOTING OFF THE SOLID

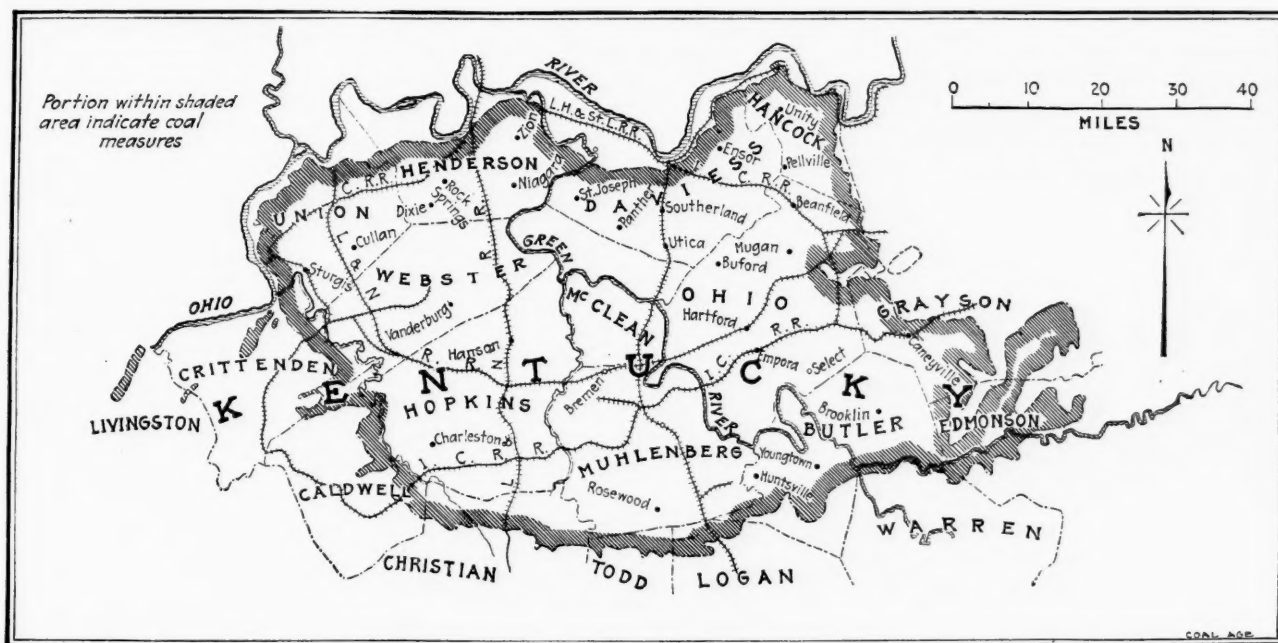
Because of the dangers attending the shooting of coal from the solid, Chief Inspector Norwood has repeatedly discouraged this practice. In his report of 1891, he comments in part as follows:

"Shooting off the solid is less common now than a few years ago, when the prevalence of this practice called for a warning from this office. Coal dust is now (speaking of 1891) generally admitted by those who have studied the question, to be almost as dangerous as firedamp. An explosion may occur in any dusty mine and one is to be expected where shooting off the solid is practiced."

When unsupported, the roof of the working places in the No. 9 seam presents a great hazard to the life of the workman. Only by careful inspection and thorough propping, can accidents be avoided. As workings approach crop lines the liability of accident becomes even greater, since the black slate here shows marked tendencies toward disintegration.

In the No. 11 seam, the bone roof, between the coal and the limestone, is even more dangerous than the slate roof of No. 9. After the coal has been shot down, the bone roof will overhang the working places in thicknesses varying from 4 to 30 in. Being exceedingly treacherous, it will work downward from the limestone cover and fall without warning.

One of the large operators has the coal cut by hand in the workings of those entries where the roof is such as to necessitate propping too close for the operation of a coal-cutting machine.



THE WEST KENTUCKY COAL FIELD

Thus, almost two decades prior to the scientific investigations and experiments conducted to prove that coal dust was an explosive agent, the chief inspector of Kentucky, together with other advanced thinkers, declared that dangers were attendant upon the presence of coal dust in our mines.

In connection with shooting coal from the solid, it is worthy of note that the machine-mined coal in western Kentucky was 26 per cent. of the field's output in 1895; in 1911 it was 79 per cent., an increase in 16 years of 53 per cent. In Hopkins County, the largest producing county of the state, 2,550,000 tons of coal were mined in 1912, 99 per cent. of which was undercut by machines.

#### ACCIDENTAL DEATH RATE LOW

It is to the credit of the mine inspectors and mine managers alike, that the last report shows an unprecedented increase in the amount of coal mined per fatal accident. In 1910 there were 159,033 tons of coal won for each life lost. In 1911, the production per fatality was 790,222 tons.

Overlying these coals is from 10 to 15 ft. of light-gray shale, which is in the advanced stages of disintegration. On removing all the coal, the shale will fall to heights of 6 to 8 ft.; 12 to 18 in. of coal is, therefore, left overhead as a roof, of which 60 per cent. is reclaimed in the rooms after they have been exhausted. When the coal is mined to its full thickness the rotten overlying shale requires timber sets, thoroughly and solidly lagged, to hold it. In all entries no attempt is made to reclaim this top coal.

The degree of caution exercised within the mines in this field by superintendents and foremen is reflected in the following accident list:

During the year 1911, in the entire western Kentucky field there were only three fatal accidents from falls of roof, and 19 minor or nonfatal accidents from the same cause.

#### COAL RECOVERY 66 PER CENT.

A fair estimate fixes about two-thirds as the net proportion of coal which is won from the mines. Excessive competition in this field leaves so small a differential between



costs of production and sales prices that crop coal, and coal of more expensive excavation must be left untouched and forever lost. Despite decreases in the market price, the consumer becomes more exacting and much coal is wasted at the tipples in cleaning the product to make the grades salable at even a small figure. Good coal clinging to lumps of sulphur is often discarded on the waste piles in quantities which more than justify the lamentations of those who are sincerely interested in the conservation of our coal resources.

#### EXCESSIVE LOSS IN CLEANING

A large operator in this field discovered that in satisfying the exacting demands of his customers he was throwing away, on his refuse pile at a single mine, coal, which if properly cleaned, would have yielded him in the neighborhood of \$1000 per month. This shows that if there had been some means of preparing this coal for use, provided that the mine was operating on a very narrow margin of profit, the net value would have done much toward helping the balance on the credit side of the ledger.

Another source of waste in this district is the indifference with which some of the operators plan the future development of their property. On good authority, it is claimed that 50 per cent. of the operators have no idea as to the amount of the holdings which they have already exhausted. Coincident with this is the general scarcity of technically trained engineers.

Inadequate pillars also contribute to the general waste. Frequently the smallness of pillars results in a squeeze which necessitates the abandonment of the working places. These rooms must then be recovered by driving "cutoffs," at much additional expense. Much of this coal is ultimately lost.

It is taken for granted by most western Kentucky operators that squeezing goes hand in hand with the mining of coal. It is regarded as a necessary evil, as if it was one of the penalties of mining.

Operators working seams other than Nos. 9 and 11, in several instances, find it wholly impossible to recover more than 44 per cent. of their available coal and are required by their conditions to leave more than half of the coal unmined.

#### COST KEEPING

Another question needing attention in this field is that of cost keeping. It is perfectly safe to say that 75 per cent. of the operators do not know what it costs them to mine a ton of coal. They get extensions on bills and buy equipments on the instalment plan with interest. This method of doing business does not constitute bad management, but in many cases these items are not charged off in keeping with a careful accounting system. At the end of a given period the operators find their balance on either one side of the ledger or the other, but how it came about there is no telling.

The other 25 per cent. of the managers who keep detailed information on this phase of operation are those that have been producing the larger outputs.

#### POND SITES

Most of the coal acreage in the western field lies inland between the Ohio and Green Rivers, and because of the flat surface, trouble is often experienced in locating

reservoir sites with sufficient water sheds. In such cases, extended droughts necessitate either long pipe lines or the hauling of water in tank cars.

#### COMPETITION

The conditions which tend to promote keen competition in this field deserve mention. Involuntary suspensions in other fields have in times past created a demand for western Kentucky coal in the large markets outside of its natural sale zone. Limited capital has drawn the conclusion that the lucrative mining of coal means only the sinking of a shaft or the opening of a drift. The comparative ease with which such openings are made in this field, the cheapness of coal "in place," together with short periods of spasmodic prosperity, have brought into being small operations which cannot be sustained by the normal demands of the present market.

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### New Mining Law in Kentucky

A bill was recently introduced by Mr. Arnett (Senate Bill No. 321, Feb. 19, 1914), in the Kentucky Assembly, and promptly referred to the Committee on Mines and Mining. The bill is a practical revision of the mining laws of the state. It passed the Assembly, Mar. 15, and became the law of the state by the signature of the governor, Mar. 23.

#### A KENTUCKY DEPARTMENT OF MINES

Among the important changes in the state mining law, made by this enactment, is the creation of a Department of Mines and the authorization of the title "Chief Inspector of Mines," as applied to the official who shall have full charge of said department. By the law of 1891-93, mine inspection in the state was placed in the hands of the Dean of the School of Mining Engineering, of the State College, at Lexington, who then became the inspector of mines.

#### THE OLD MINING LAW

By act of the General Assembly, 1906, the governor was authorized and directed to appoint two additional assistant inspectors. Two more assistant inspectors of mines were authorized by the enactment of the General Assembly, 1908. The same act provided a board of examiners for the examination of applicants for certificates of qualification to serve as mine foremen. This board consisted of the chief mine inspector and two of his assistants chosen by himself from his own staff. The same law also authorized the chief mine inspector to order the employment of shotfirers in any dangerous or gaseous mine or mines employing 10 or more persons.

By act of General Assembly, 1910, the certificates of qualification were classified as follows: A first-class certificate authorized its holder to act as mine foreman in any coal mine in the state. A second-class certificate authorized its holder to act as mine foreman in any non-gaseous mine in the state. A third-class certificate authorized its holder to act as mine foreman in any non-gaseous mine employing not more than 25 persons at one time.

#### PROVISIONS OF THE NEW LAW

By the new law, Act of 1914, the chief inspector of mines is authorized to divide the state into inspection districts and to assign each assistant inspector to work in his



own district. The law also provides for the making of accurate maps and plans of the workings of each mine, within 60 days after Jan. 1, each year.

#### PERSONNEL OF THE EXAMINING BOARD

An important feature of the new law is the appointment by the governor of one miner who has had five years' practical experience in the mining of coal and is actually employed in mining coal at the present time, and one coal operator or his representative who is actually engaged in the operation of a coal mine in the state at the time, as members of the examining board, thus increasing the board members from three to five. The chief mine inspector is made chairman of the board and two of his assistants are of his own selection. The examining board examines all applicants for the positions of assistant inspector of mines, mine foreman and fireboss.

Another feature of the new law is the provision that no person shall be permitted to serve as mine foreman or fireboss, in any mine employing 15 or more persons at one time, except a person holding a certificate of qualification granted by the examining board, making him eligible for such position. The new law defines terms and specifies the duties of mine superintendent, mine foreman and fireboss, and contains a number of other provisions relating to ventilation, drainage, safety lamps, the firing of shots, electrical installations, first-aid supplies and the storage of oil and explosives. Many other points of importance are also included in the new law,

which marks a commendable advance in the efforts to conserve our coal beds, increase efficiency and promote safety in mining.

### First Aid and Accident Prevention

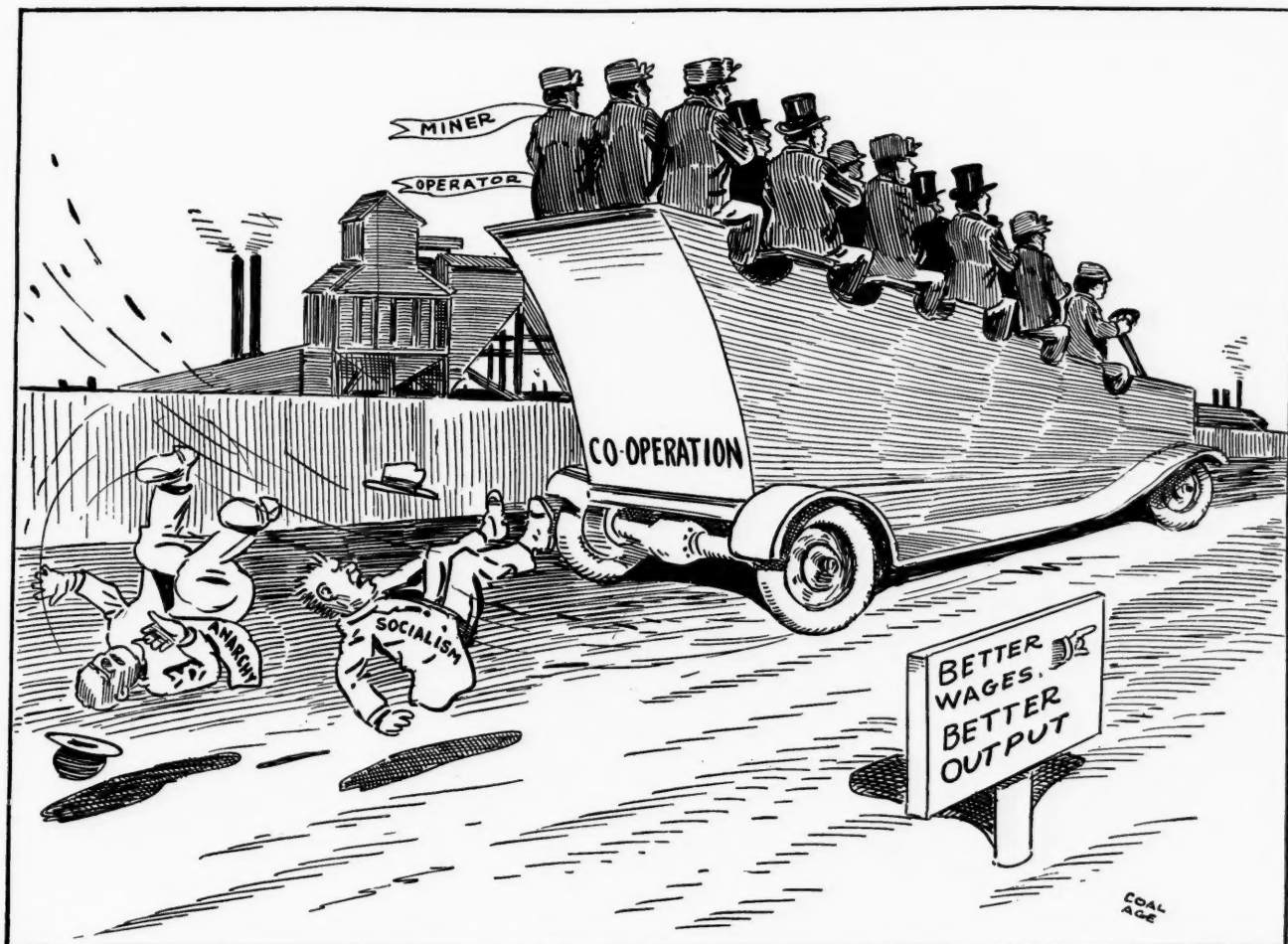
By A. S. SNYDER\*

Instruction to first-aid men should not be restricted to the rendering of first aid for injuries. Prevention of accidents is just as important a study as is how to take care of an injured man.

Those who have received instructions in first aid are usually more alive than others to the dangers surrounding mine work and more careful to avoid them. This care should be impressed on them in their training and they should be urged to report all dangerous conditions which may come under their notice to the foreman or his aides unless they can themselves remove the danger.

The saving of life is the most important of all conservation, for without human life of what use is the conservation of any natural resource—minerals, forests or what not? The prevention of accidents is profitable to everyone—to the employee, the employer, the community and above all, to those who are dependent on the wages of the employee.

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LET'S ALL GET INTO THE BAND WAGON

# Anthracite Colliery Boiler Plants

By J. F. McMAHON\*

**SYNOPSIS**—Many boiler plants throughout the anthracite region of Pennsylvania are anything but economical in their use of fuel. By the use of modern boilers equipped with proper auxiliaries the cost of steam may be reduced 60 per cent.

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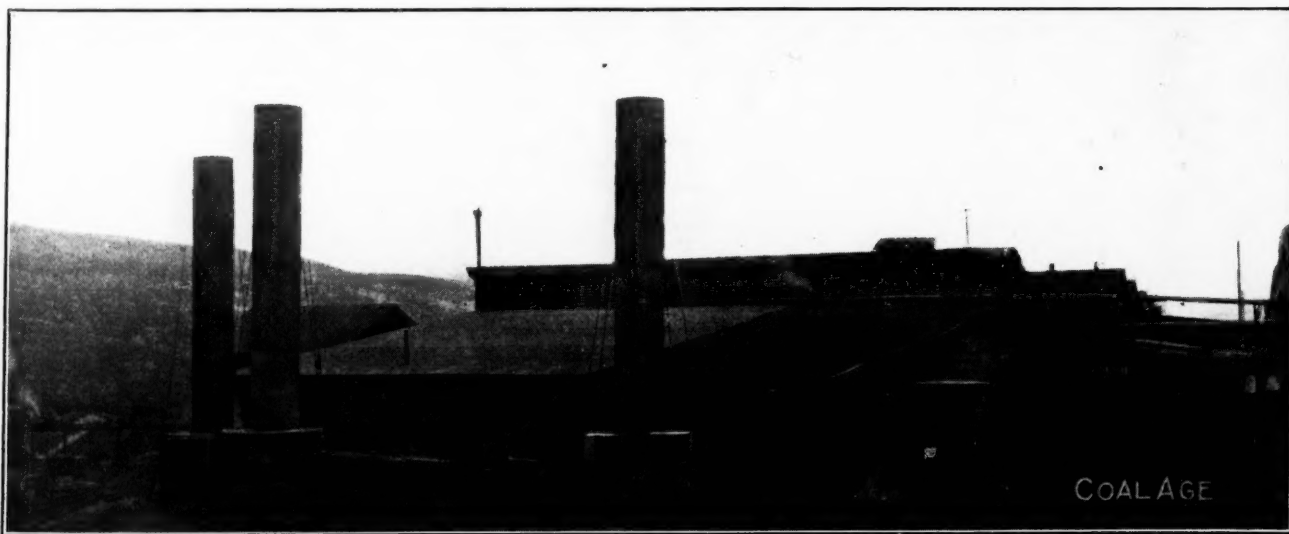
It is an admitted fact that anthracite-colliery boiler installations seldom attain the standard of efficiency secured by public-service companies. The reason frequently ascribed for this state of affairs is that in many instances the colliery management has been incumbered with an adverse inheritance, consisting of either cylindrical, tubular, locomotive or some ancient type of water-tube boilers. These, besides being inefficient, possess disadvantageous conditions so far as fuel and ash handling is

## STEAM EQUIPMENT SHOULD BE CENTRALIZED

In order to accomplish the maximum efficiency in power-plant design and operation, the entire steam-generating equipment should so far as possible be centralized in one general unit with the distribution lines radiating to the various steam consumers. Provided these lines are properly covered this arrangement is vastly superior in economy to several isolated plants.

The boilers employed should be of the latest water-tube type, having a ratio of heating surface to grate area of about 25 to 1, and never exceeding 30 to 1.

The air space of the grate should be from 8 to 15 per cent. of the grate area with the openings suitable for sustaining buckwheat coal, which passes through a  $\frac{3}{16}$ -in. mesh and over a  $\frac{1}{32}$  mesh. Sectional dumping grates,



GENERAL VIEW OF AN ANCIENT ANTHRACITE BOILER PLANT. MANY SUCH PLANTS ARE STILL OPERATED

concerned, with the result that men and mules have become a constant charge in their operation. Furthermore, as the fuel consumed is ordinarily Buckwheat Nos. 2 and 3 with a more or less generous mixture of Buckwheat No. 1 in extreme conditions, it is impossible to realize even approximately the heat content of the coal.

In many instances, however, such extravagant conditions and practices as exist in power plants throughout the anthracite region show either a lack of forethought or positive negligence upon the part of both engineering department and management, and unless the assured life of the colliery is extremely short, a change of equipment (upon which benefits might be realized at once) should be undoubtedly made. While cases may exist where good engineering economics would dictate that the equipment should remain in a *status quo* without remodeling or improvement, these are isolated and the general statement holds true that in most instances anthracite boiler plants might economically be made efficient and acceptable to the best present-day engineering practice.

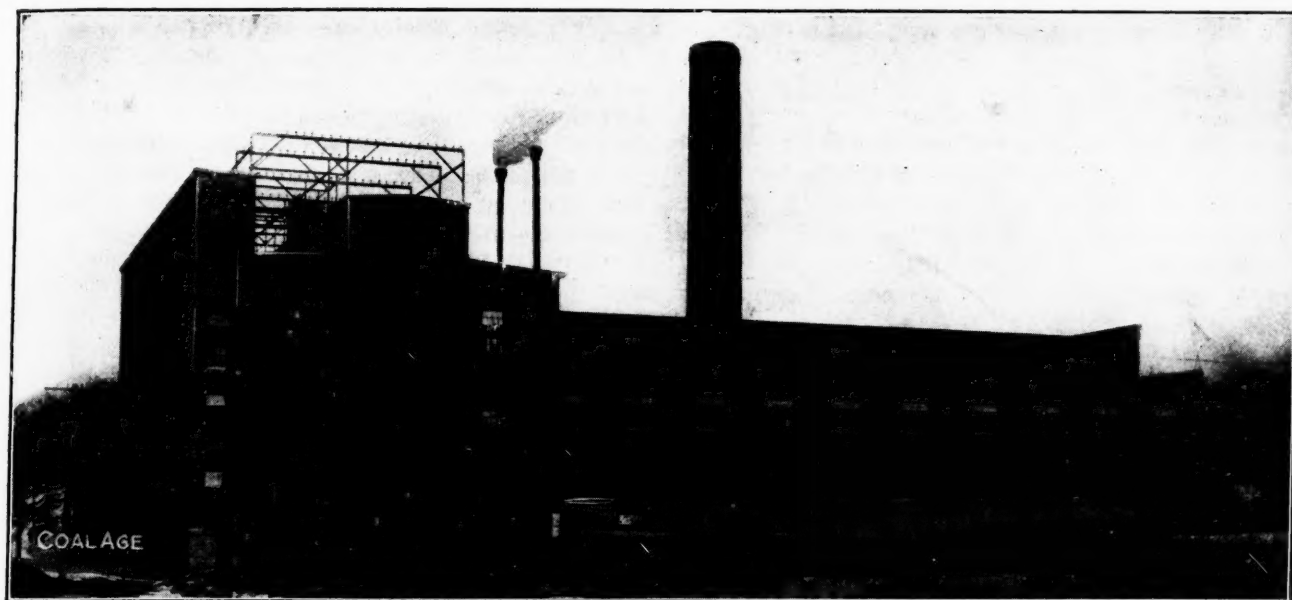
\*Wilkes-Barre, Penn.

stationary grates having a discharging section or a discharge outlet in the deadplate should be employed. Regardless of whether the plant is erected new or remodeled every facility should be employed for discharging the refuse material quickly and with the least labor.

Ash disposal may be accomplished in a variety of ways. The ashes may be conveyed with water by gravity to a common point and there transferred to cars. The ash pits may discharge direct to tunnel cars, which may be disposed of in some suitable manner, or the refuse material may be disposed of by means of an overhead or aerial ash-handling equipment.

The fuel may be brought from the breakers by a conveyor line to a general overhead coal bunker or it may be brought to the boiler house in railway cars, being dumped through a tunnel or trough to a table or bench, so placed as to be most convenient to the firemen, thus eliminating unnecessary manual labor and tending toward a clean boiler room.

A firebrick arch, a Dutch oven, or an adequate distance between the lower row of boiler tubes and the grate line should be provided as these are important factors exerting a definite influence where high rates of combus-

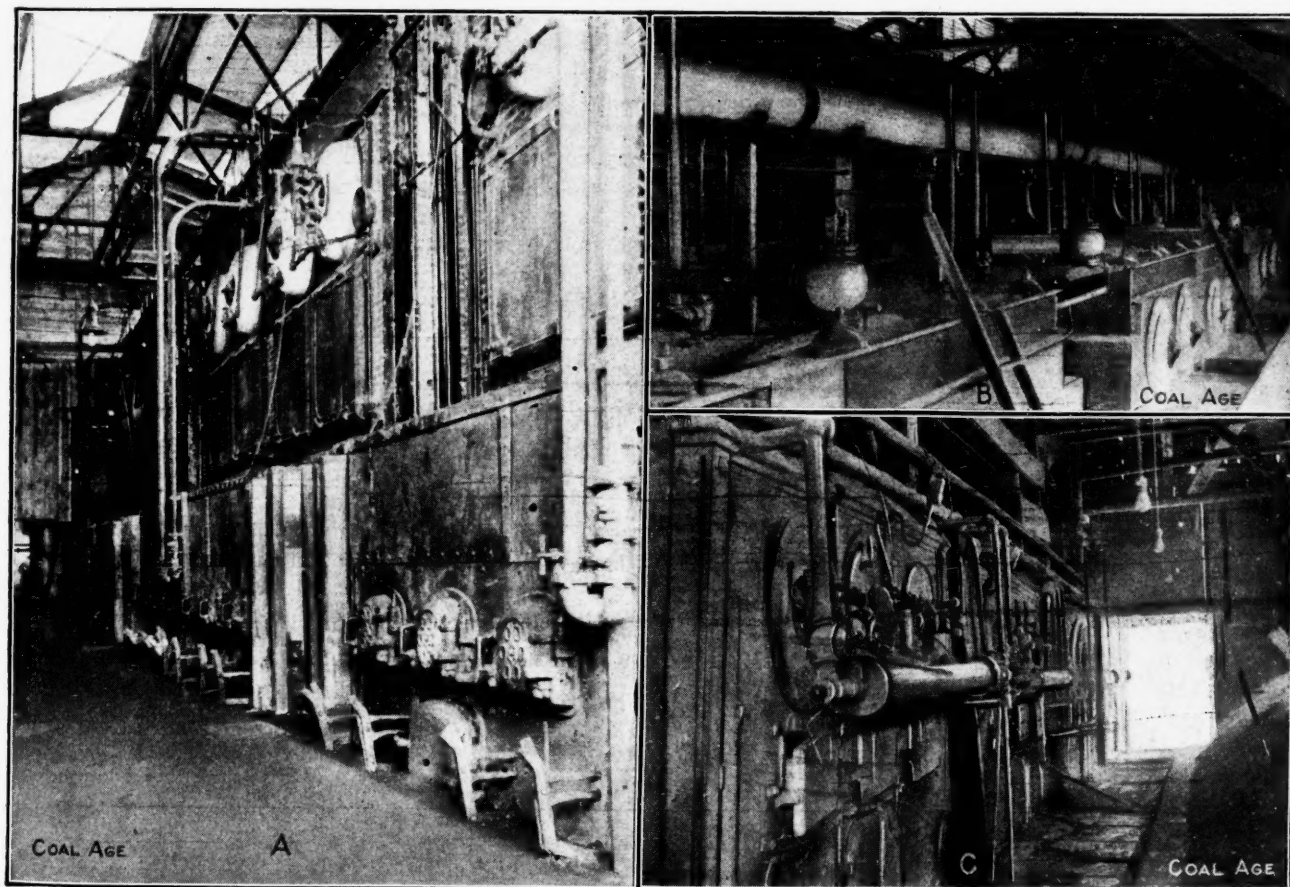


GENERAL VIEW OF A MODERN ANTHRACITE POWER PLANT

tion are to be attained. The boiler should be so baffled that the gases may impinge upon practically the entire heating surface, yet still give sufficient stack temperature to maintain the draft. The stack dampers should be so controlled as to maintain as high a gas velocity as is consistent with the production of a minimum negative pressure in the firebox.

## SOME ATTAINABLE RESULTS

With proper construction the temperature of the furnace should reach 2500 deg. F., and the products of combustion should leave the third pass and enter the breeching at a temperature not exceeding 550 deg. F. If these conditions exist, the boiler has done its full duty in heat absorption.

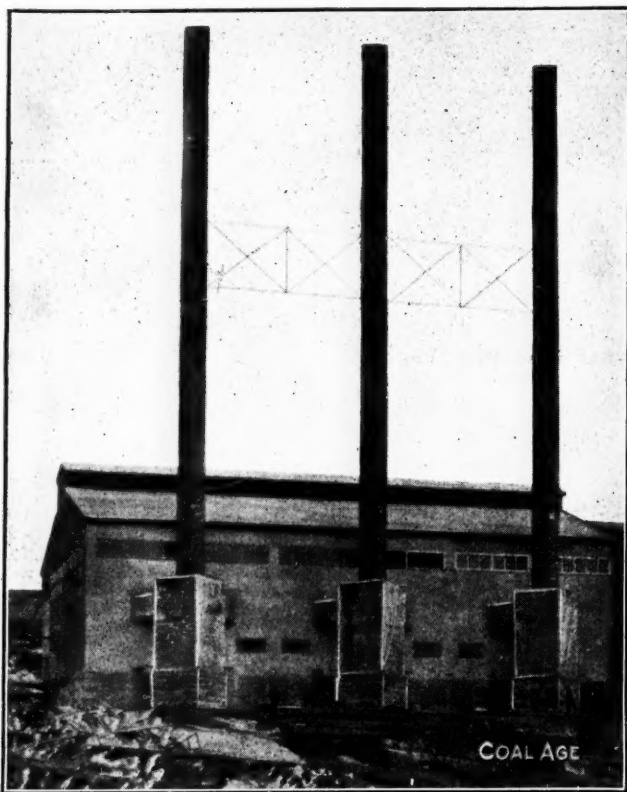


A. A NEAT MODERN FIRING ALLEY. B. PIPING ABOVE BOILERS SHOWN IN A. C. FIRING ALLEY IN USUAL TYPE OF BOILER PLANT



In order to secure a proper gas velocity, it is imperative to have a suitable diameter and height of stack to give sufficient draft to overcome the resistance of the boiler when passing the maximum amount of the products of combustion and maintain a slight negative pressure in the firebox. Since forced draft is employed, the ashpit pressure is, of course, positive, and varies anywhere from one to three inches of water, depending on the thickness of the fire and the resistance of the grates.

The coal used will probably contain between 18 and 30 per cent. of ash; while the heat content in the combustible will range between 10,000 and 12,000 B.t.u. per pound. It is sometimes preferable to employ a late type of two-stage steam blower to furnish draft, since the



A MODERN REINFORCED-CONCRETE BOILER PLANT

moisture of the steam passing up through the grates will prevent clinkering. This service represents about 4 per cent. of the evaporation of the boiler. Where sufficient exhaust steam is available and can be injected directly under the grate, an air blast is without question preferable, as this seldom requires over 2 per cent. of the evaporation.

But with all of their refinements, such boilers as have been described above, are not in themselves sufficient to give best results. It is first of all essential that boilers should be properly housed in a building giving abundant light and provided with ventilators for the escape of foul air and gas. The latter should be so arranged that in cold weather the boilers are so protected from drafts that there is no danger of the fittings freezing. Doors and windows should also be so arranged as to prevent currents of air sweeping from one end of the boiler room to the other and endangering the health of the attendants. A good boiler room is comfortable in the severest weather, the temperatures never falling below 60 deg. F.

#### JUSTIFIABLE AUXILIARIES

With such boilers and plants we are justified in installing such auxiliaries as soot blowers for the boiler tubes; regulating-valve control for the boiler feed water; draft-gage control for the stack and firebox, which indicates the air pressure and the condition of the fire, and whether the boiler is operating under or over its rating; steam-recording gages, which show the amount of steam produced; a temperature-recording gage in connection with the feed-water heater; and a gage showing the total amount of water used by the plant. Where much blowing off of boilers is required, a V-type recording gage is necessary.

With a coal-consumption recording device installed in the funnel leading to the receiving table of each boiler, a positive check is at hand on the firemen, and each man may be thus required to perform his true share of the work. The quantity of coal supplied to and consumed in the firebox must be uniform throughout, and the firemen, after being instructed by a qualified expert, may be placed in charge of the water tender, whose duty is to see that they do their *pro rata* work while he controls the feed water.

With this arrangement and organization any request for a greater quantity of steam or any complaint of whatever kind or source upon the boiler house should be taken up direct with the water tender, without interference of any kind or in any manner with the individual firemen.

It should be unnecessary, except as a passing remark, to state that all steam, exhaust and feed-water pipes, as well as exposed headers, should be properly insulated.

Besides providing connecting pipes suitably proportioned for the amount of steam carried, the safeguarding of workmen in and about the boilers, has become voluntary on the part of all coal companies. Such precautionary apparatus covering all suggested dangers is a necessary part of any new installation.

Non-return valves on the boiler nozzles with gate valves in the pipes connecting them to the main header, automatic closing valves on the water columns, safety fire doors, extra valves on the boiler blowoff, guards over dangerous moving parts of auxiliary machines and illuminated danger signs to be employed when repair work becomes necessary, have all become a part of modern equipment. Furthermore, for night operation abundant lighting should be furnished for reading gages, and for necessary movement about the building.

Sanitary wash rooms, drinking fountains and restful seats provided with backs may also well be provided. These latter may appear as an unimportant luxurious comfort, but observation of their effect by comparative timing in the cleaning of fires shows a saving due to their use of from 33 per cent. to 50 per cent.

#### A PERMANENT LOG SHOULD BE KEPT

The employment of recording and measuring instruments is valueless unless the charts secured are properly worked up and placed in a log or static form, so that the superintendent or engineer in charge of the equipment may readily observe whenever there is a failure to maintain the standard established in any department. While this data is primarily valuable to those in direct responsibility for economic operation, it is of natural interest to those who actually handle the fuel and water. It is well,

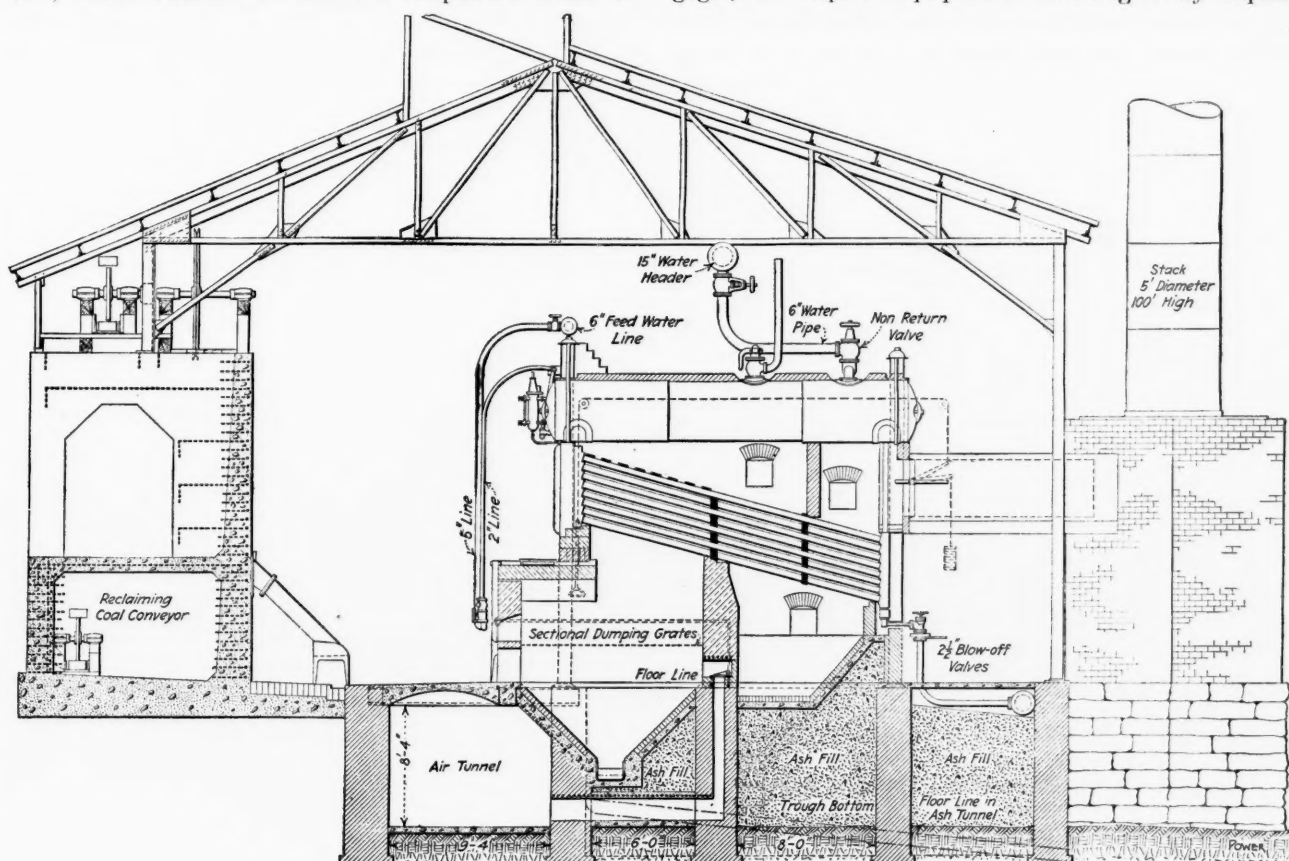
therefore, to tabulate in simple form the weekly log, made up of the names of the firemen on the various shifts, together with that of the foreman and the actual quantity and size of fuel used, the steam generated or boiler horsepower developed, also the weather conditions and whether the figures were secured on an idle or working day.

After a standard for boiler efficiency has been established if the firemen develop skillfulness in exceeding this basis of work an approved sliding-scale bonus will automatically establish the best and most skillful men and make employment in the boiler house a competitive and desirable occupation. Such an arrangement should not conflict with the standard wage paid for general service in or about the colliery. Such standard wage, however, would become the minimum compensation and the

chines, the boiler house is in reality the first place wherein to inaugurate improvements, as there the fixed charges and the wastes are constant and consequently heavy.

#### COSTS AND RETURNS OF REMODELING

The question to be solved, therefore, resolves itself into two parts, What will the necessary equipment cost, and what will be the saving? A new plant complete with a steel-frame building with reinforced-concrete or brick sides, fireproof roof, boilers, stacks, ash pits, forced draft, blowers, ash-conveyor lines and hoppers, steam headers, feed-water lines, steam soot blowers, concrete coal bunker, coal conveyors, turbine centrifugal or compound boiler-feed pump, feed-water heaters, recording instruments, gages, a complete equipment including every expense



CROSS-SECTION THROUGH A MODERN BOILER PLANT

basis upon which the bonus scale should be established.

Such improvements as have been above described would render it possible to operate a boiler continuously at 150 per cent. of its normal rating, while under emergency it might be crowded to 200 per cent. of its rated capacity. The number of boilers necessary for any installation will, therefore, be reduced to a minimum.

A still further refinement in steam consumption is that of superheating the steam to approximately 100 deg., delivering it at that temperature to the various steam users. Such a superheat has no particular bad effect upon the working parts of the various machines and effects a decided saving in the actual amount of steam consumed.

Advantageous though it may be to compound the cylinders of pumps, compressors, and the like, substitute Corliss or four-valve gear for the ordinary D-slide valve on simple engines and operate a plant condensing, as well as cover the steam lines leading to the various ma-

except the value of the land occupied by the plant and the tracks approaching it, will cost about \$28 per boiler-horsepower.

The type of boiler-feed pump to be used is worthy of careful consideration, as this is an important part of the steam-generating unit. A compound steam or a turbine-driven centrifugal pump of the number of stages most suitable for the steam pressure carried, is the most efficient.

Another important consideration is the location of the feed-water heater. This may be in the boiler plant or at some point in close proximity thereto, where the greatest number of exhaust-steam feeders is available. In the latter case the small feed-water line from the heater and pump to the boilers is much less expensive than a large exhaust line with its high insulation cost. This, however, is a consideration which may be readily determined in the layout of a plant.

With efficient and up-to-date equipment, a boiler-horsepower-hour may be developed on about 4.36 lb. of dry coal, 8 lb. of water being evaporated per pound of coal from and at 212 deg. F. Assuming a value for the fuel of 50c. per ton, this corresponds to a coal cost of \$1.09 for 1000 hp.-hr.; while the other expenses of the plant may be calculated as follows:

	Per 1000 Boiler Hp.-Hr.
Fireman, @ \$6.18 per 24-hr. day.....	\$0.29
Water tender, @ \$6.24 per 24-hr. day.....	0.03
Ash removal, @ \$1.51 per 9-hr. day.....	0.02
Maintenance of plant.....	0.008
Fire insurance, eliminated. Building fireproof.....	0.013
Safety boiler insurance.....	0.013
Total operating and maintenance cost.....	\$1.451

With the old type of equipment, 7½ lb. of dry coal are necessary to develop 1 hp.-hr. Taking this coal as being worth 80c. per ton, this is equivalent to \$3 per 1000 hp.-hr., while the other expenses as before are:

	Per 1000 Boiler Hp.-Hr.
Fireman, @ \$6.18 per 24-hr. day.....	\$0.60
Water tender, @ \$6.24 per 24-hr. day.....	0.06
Ash handling, labor, @ \$5.46 per 24-hr. day.....	0.10
Maintenance of plant.....	0.007
Fire insurance of plant.....	0.003
Safety boiler insurance.....	0.015
Total operating and maintenance cost.....	\$3.785

As may be seen from the above, the saving which may be effected by the installation of modern apparatus is equivalent to \$2.33 per thousand horsepower-hours, or 62 per cent. of the original cost for power. This may be properly credited against the amortization of the new equipment, and forms a basis upon which the advisability of remodeling a boiler plant may be readily determined.

It is further suggested that all of this class of work should be contracted for through competitive bids. This is because a mining organization should rightfully concentrate its efforts on the economic production and preparation of coal, and do as little work outside of this department as is consistent with reason.

### ■

## An Extraordinary Experience

The following is an account of an experience that I recently had with gas, at a new opening along the Montour R.R., Washington County, Penn. Some who read this will undoubtedly recommend me for membership in the "Ananias Club"; but, nevertheless, the facts stated are absolutely true.

A few days ago, a fall occurred in one of two entries that were being driven for ventilating purposes. Three or four cars of roof slate and coal fell suddenly, near the face of one of these entries. A short time before, the roof was apparently sound. As the cavity filled with gas, I had a canvas brattice run from the last breakthrough to the fall, and the face was practically clear before the last nail was driven. A current of about 6000 cu.ft. per min. was passing the place.

A little later, not being able to detect gas with the safety lamp, I raised an open light into the cavity above the fall to inspect the condition of the hanging rock. About 6 in. from the top of the cavity, the light was suddenly drawn upward and the lamp extinguished. Wondering at this, I relit the lamp and tried again, raising it more slowly. At about the same distance from the top, as before, I noticed a blue flame appear around and above the flame of the lamp. Holding the lamp still in this position, I observed as pretty a cap as was ever

formed in a safety lamp. This cap was from 4 to 4½ in. in length, about 1 in. in diameter at the base and tapered to a point. After observing the cap for about 30 sec., I slowly raised the lamp higher and the flame was extinguished. Continuing the experiment, I repeatedly got a cap on the open flame, which was extinguished on raising the lamp higher, as before.

On one occasion, the cap was detached from the lamp and drawn up against the roof where it revolved like a top, moving around a space from 5 to 10 ft. in diameter. This continued for about ½ min., when suddenly a burst of flame rolled up to the face, down both ribs and back both sides of the canvas. This left the impression that there was gas below and all around. The flame was not a compact body, but descended from the roof in folds or waves, making an interesting sight.

Two days later, I repeated the experiment, and obtained the same results as before, in the presence of the superintendent and two firebosses, who exclaimed, "Pretty!" "Beautiful!" During the last four days, I have repeated the experiment several times with the same results. In making these tests, immediately after the gas would burn itself out bursting into a flame as described. I would raise an open light and get a cap 1 ft. from the top, but the flame would be extinguished on raising the lamp higher. In some of these attempts, it would be difficult to light the gas, except where it issued from the fissures of the slate; but, after repeating the experiment two or more times, the gas ignited more readily.

I should state that the top of this cavity is about 3½ ft. above the "lip" or drawslate. The slate fell to a white "bastard" slate, having a smooth surface. The gas is given off quite freely through a fissure in the slate 9 in. in length and some fissures on the sides; but the pressure is not sufficient for the gas to be heard as it escapes from the strata. The color of the burning gas is a dark red or purple.

I have tried to describe the observed phenomena as nearly correctly as possible, relating the incidents as they have occurred with little variation during the last four days. I will not attempt to offer any opinion myself, but would be glad to have the readers of COAL AGE suggest a possible cause for the strange behavior of the gas. After an experience of six years as fireboss, assistant mine foreman and mine foreman, in mines of three different counties in the Pittsburgh district, all of which generated more or less gas, this is the most extraordinary occurrence I have witnessed.

I may add that, to test the gas further, I cut off the air from the place and allowed over a foot of gas to collect, when it acted the same as ordinary explosive gas. When doing this, however, I used only a safety lamp.

JOHN LAWLOR, JR.,  
Mine Foreman.

Lawrence, Penn.

[The above narration must be taken for what it is worth. Allowing its credibility, it portrays an almost inconceivable exhibition of reckless daring on the part of those who observed the alleged experiments. While we would not question the veracity of our correspondent, we are compelled to suggest that the repetition of such experiments is to court danger and possible death, not only for one's self, but for all in the mine at that time. We hope to hear further comments from readers.—EDITOR.]



# The Kentucky Compensation Act

*SYNOPSIS—A review of the salient features of the Workmen's Compensation Act, recently passed by the Kentucky Legislature, with particular reference to its bearing on the coal operations of the state.*

The recent passage by the Kentucky legislature of the Workmen's Compensation Act will affect scores of large and small coal operations in both the eastern and western sections of Kentucky. The passage of this act is due largely to the strong coalition formed in support of it by the coal miners and coal operators of the state.

Originally, there were four bills on this subject before the legislature, COAL AGE, Vol. 5, p. 362. The similarity between these several bills, however, led, eventually, to the substitution of the original labor bill (the Meyers-Knight bill), and it was this which became a law.

Supporting the bill, as finally adopted, were such organizations as the Kentucky Mine Owners' Association, the Southern Appalachian Coal Operators' Association, and the Western Kentucky Coal Operators' Association. The Kentucky Mine Owners' Association was most active in its efforts to secure compensation legislation, and during the entire session, maintained headquarters at Frankfort, the capital, where President Hywell Davies and Secretary W. H. Cunningham were in active charge.

The principal features of the compensation act are: State insurance, with options to permit the employer to carry his own insurance, or to secure liability insurance; administration by a board composed of existing state officials, with the minimum of expense; penalty by additional premiums where willful injury is inflicted, or is received, where the employer is violating the law; semiannual readjustment of rates, based on experience of the preceding six months.

## THE WORKMEN'S COMPENSATION BOARD

The attorney-general, the commissioner of insurance and the commissioner of agriculture, labor and statistics of the state are to constitute the Workmen's Compensation Board under this act, which will take effect Jan. 1, 1915. Each is to receive in this capacity a salary of \$75 per month payable out of the compensation funds.

The board is given all necessary authority to administer the act, such as that to make investigations, swear and examine witnesses, punish for contempt (through the courts), and so forth. It is authorized to collect from employers detailed information regarding their business, insofar as it is pertinent for the purposes of the act, but it is provided that this information shall be regarded as confidential, and that any person connected with the board divulging any such information, except in authorized statistical form, shall be fined not less than \$100 nor more than \$500.

All employers of six or more persons, in any of the 22 classes created by the act, as these may be rearranged or modified by the board, and all who may, with their employees, voluntarily make application for that purpose, are made subject to the provisions of the act. And "coal mines, including their tipples, power, light, heating and ventilating plants, tramways, private tracks and sidings, and accessory and auxiliary plants, working in or with byproducts," comprise the first class.

Rates for the purpose of accumulating a compensation fund, not exceeding a maximum charge of \$1.25 on each one hundred dollars of the gross annual payroll of each employer, are to be fixed by the board, subject to the semi-annual readjustment referred to; and in order to enable the board to proceed to fix its rates, as provided by the act, they are required to furnish all information desired, under penalty of a fine of \$500, to be collected by civil action. Premiums are payable monthly, but those for the first three months are to be paid on or before Jan. 1, 1915, in order to give a substantial fund to start with.

The usual provision, that the continuance in the employment shall be conclusively presumed, as against any employee, to constitute a contract with the employer to accept the compensation provided by this act, in case of injury, and to waive all right of action for such injury, where the employer has given notice of his intention to accept the provisions of the act, is included; but, it is also provided that where an employee elects, and so informs his employer, not to accept the provisions of the act as to compensation, the common-law defenses of contributory negligence, assumption of risk, and the act of a fellow-servant are to be available against him, with such others as may exist.

On the other hand, it is provided that where an employer elects not to accept the provisions of the act with reference to compensations, he shall be deprived of the common-law defenses. He is also specially penalized in cases where injuries are due to his willful act, to the failure to perform a statutory, or other nondelegable duty, or where a minor employee, illegally employed, is injured. In certain of these cases a right of election is given to the employee between his right of action and the compensation provided by the act.

Injuries received by employees while intoxicated, or by their deliberate, self-inflicted act, or by willful misconduct, are barred.

## COMPENSATION OBTAINABLE

The act provides for a maximum compensation of \$3750 in case of death or permanent disability, and of one-half of the weekly wages, with a maximum of \$12 a week, for injury resulting in temporary total disability. For temporary disability the compensation is one-half of the loss of income caused by the disability, with a maximum of \$12 a week. The minimum weekly indemnity is \$5, except where the weekly wage is less than that sum, when the compensation equals the wage.

Hospital and medical attendance, to the extent of \$100, are to be paid out of the fund, and funeral expenses up to \$75, in addition to other compensation; and in case of death, where there are no dependents, these items are all the payments to be made out of the compensation fund. Dependents are defined as the wife, living with the deceased at the time of his death, and children under the age of sixteen, living with the parent. In other cases the board decides the matter as a question of fact, with the limitations that no person shall be considered a dependent except husband or wife, brother or sister, ancestor or lineal descendant.

Upon satisfactory proof of solvency and ability to pay

the compensation provided by the act, any employer may administer the compensation himself; and he may, in such case, carry liability insurance, "provided the amounts to be paid are not less than that provided in this act"—a proviso which would seem to be of but little benefit to the liability-insurance companies, in view of the fact that the usual policy limits their liability in any one accident to \$10,000, and that their rates, for coal mines, at least, are much above the maximum rate provided for in the act.

All employers subject to the act must notify the board on or before Nov. 1, 1914, of their election not to accept the provisions of the act.

There are appropriate provisions covering adjustment of controversies, appeals, employers in interstate business, and so forth, but those outlined above are the salient features of the act. The coal interests of the state, operators and miners alike, are willing, as far as is now apparent, to accept it and act under it, leaving such defects as may appear to be remedied by future legislation.

✠

## A Method of Measuring Goaf Temperatures\*

BY T. F. WINMILL

*SYNOPSIS*—A description of the construction and application of a new instrument for measuring goaf temperatures, together with certain tests relating thereto. The device exhibits increased electrical resistance on any rise in temperature.

✠

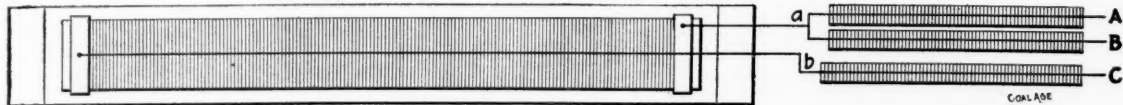
It is important to know, in connection with the question of gob fires in mines, what is the normal goaf temperature. If the goaf be absolutely air-tight, its temperature should ultimately become that of the undisturbed

insulated wire are then soldered, one to each copper collar, in the position shown. The coil is now wrapped in very thin asbestos paper in order to insulate it, and slipped into a copper tube, the ends of which are then sealed with any of the usual silicate cements. Long leads must then be fixed to the projecting copper wires at *a* and *b* so that the coil may be well buried in the goaf. These wires are made most conveniently of three No. 22 gage copper twisted together and well insulated. Two leads are fastened to one of the coil-terminals and one lead to the other.

In measuring the resistance from the end of the leads *B* and *C*, the resistance of the coil plus the resistance of the leads is obtained; but in measuring the resistance between *A* and *B*, the resistance of the leads only is arrived at. Since all the leads are exactly similar, the difference between these two measurements gives the resistance of the coil independently of that of the leads. By this means leads any length desired may be employed. Certainly leads a mile long would offer no difficulties to accurate measurement of the resistance of the coil.

### HOW THE APPARATUS IS USED

The apparatus is used as follows: The copper tube is placed in a strong iron tube of about the same length, and then put in the desired position in the open goaf. As the face advances and the goaf closes, the leads are carried forward along the floor, being covered with about 6 in. of sand, so as to prevent them from being cut as the weight comes on. The coil is then permanently in position and by measuring the resistance at any time the goaf temperature at that point is obtained. Under most favorable conditions the measurements are correct to about  $\frac{1}{10}$  deg. F., more generally the accuracy is about  $\frac{1}{2}$  deg. F.



INSTRUMENT FOR THE MEASURING OF GOAF TEMPERATURES

strata surrounding it. A small air-leak will, however, cause oxidation of the coal left in the goaf and a corresponding rise in temperature.

An apparatus has been devised which will allow of a continuous measurement of the goaf temperature in any place, without the necessity for boreholes. As is well known, the electrical resistance of a metal varies considerably with the temperature, and this property is made use of in constructing resistance thermometers. These instruments are very commonly used for accurate temperature measurements, and a simple modification suitable for use in mines is herewith described.

### DESCRIPTION OF THE APPARATUS

A strip of sheet-mica 1 cm. broad and about 1 mm. thick is bound with two copper collars, made from strips of copper-foil. Both ends of a coil of nickel wire,  $\frac{1}{8}$  mm. in diameter, are soldered to the copper collars. For convenience in standardizing and subsequent use, the coil is made of such length as will give a resistance of 25 ohms at 0 deg. C. Two copper leads of No. 14 gage cotton-

The temperature-coefficient of the nickel wire described has been determined from measurements at 0 deg., 25 deg., 60.30 deg., 80.48 deg., 100 deg., 132 deg. and 184 deg. C., and from these results the following relation is deduced:

$$R = A + BT + CT^2$$

Where *R* = the resistance of the coil in ohms; *A*, *B* and *C* are constants, and *T* = the temperature of the coil in degrees Centigrade.

For a coil resistance of 25 ohms at 0 deg. C.,

$$A = 25$$

$$B = 1.128 \times 10^{-1} \text{ and}$$

$$C = 1.746 \times 10^{-4}$$

For a coil of resistance *A* at 0 deg. C., the above constants must be multiplied by *A*/25.

### RESULTS OF TESTS

The apparatus was tested at a rib-side which was being left to divide off a district and the results of the tests are given in the appended table. The coil is now buried at a point about 50 yd. from the edge of the goaf.

\*From a paper presented at the 24th annual meeting of the Institution of Mining Engineers, Sept. 24, 1913.

RESULTS OF TESTS WITH THE APPARATUS

Date	Measured Resistance in Ohms			Temperature, in Degrees Fahrenheit
	Coil and Leads	Leads	Coil	
Nov. 29, 1912.....	27.93	0.61	27.32	68
Dec. 13, 1912.....	27.91	0.61	27.30	67.8
Jan. 2, 1913.....	28.84	0.61	28.23	81.15
Jan. 3, 1913.....	30.41	2.21	28.28	*82.2
Jan. 10, 1913.....	30.21	2.10	28.11	80
Jan. 17, 1913.....	30.10	2.09	28.01	79
Jan. 31, 1913.....	29.91	2.10	27.81	76
Feb. 11, 1913.....	30.07	2.10	27.97	78
Feb. 17, 1913.....	30.60	2.12	28.48	85
Feb. 24, 1913.....	28.85	0.45	28.40	†84
Mar. 7, 1913.....	28.86	0.45	28.41	84
April 7, 1913.....	30.64	2.23	28.41	*84

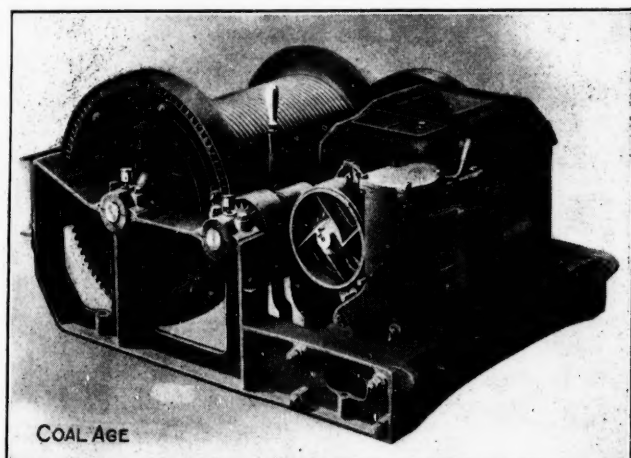
\* Leads lengthened. † Leads cut by a car.

The low initial temperatures are due to the fact that the rib-side on being left had been well stowed with wet sand. After this sand had dried, the temperature rose to that of the strata, showing that the stowing has been tight and that no air is leaking in.

### A Small Portable Electric Hoist

With the increased use of electricity around mining plants, the operators will welcome the appearance of a small portable electric hoist as shown herewith. This particular machine was designed essentially as a drag for spotting railroad cars on adverse grades, but the possibilities of such a portable and flexible apparatus around a mine are too numerous to mention.

The frame consists of heavy cast-steel sides securely connected by cast- and structural-steel cross pieces, form-



THE SHAW PORTABLE ELECTRIC DRAG

ing a rigid unit. The frame bottom is made flush for skidding and provided with bosses for holding down bolts. Lugs are also provided for attachment to hauling links for moving the machine to different locations.

The winding drum is of cast iron, machined with grooves to keep the hauling cable in place. The cable is of special plow-steel rope, 3/4 in. in diameter, 10 wires to the strand, six strands and a hemp core.

STANDARD RATINGS AND DIMENSIONS OF ELECTRIC HOISTS

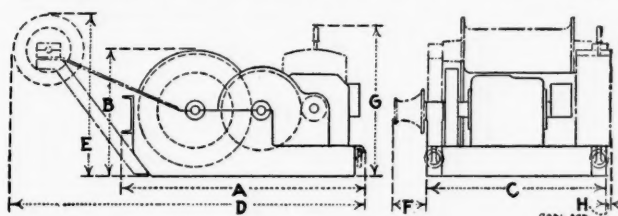
Size	Rope Pull, in Lb.	Rope Speed Ft. P. M.	Dimensions							
			A	B	C	D	E	F	G	H
5	2300	60	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	
8	2700	85	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	
12	3200	110	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	5 In.
18	4000	130	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	4 Ft. 7 In.	8 In.
25	5000	150	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	4 Ft. 7 In.	11 In.

All shafts are carried in capped bearings with bronze bushings. The gears are of steel with cut teeth. All gears are guarded. The drum pinion is free on the shaft and a jaw clutch is provided thereon for coupling same to shaft. The drum is, therefore, free to rotate when

necessary to unwind the rope by pulling on it. The clutch may be left in engagement and motor controlled at proper speed to unwind rope as the end is carried away.

The motor is rated on a basis of 40° C. temperature rise after 30-min. run with full load. It is designed exclusively for crane and hoist service.

The machine is regularly built as shown in full lines on diagram, or with either one or both auxiliaries, as



SKETCH SHOWING PRINCIPAL DIMENSIONS

shown in broken lines, i.e., guide drum or niggerhead. The accompanying table is for drags of standard specification, but machine can be altered to meet special requirements.

The apparatus is designed so that it can be used as a portable electric winch, or as a stationary electric hoist. For the latter class of service the hoist would be arranged for dynamic lowering and the controller can be located independently of the hoist proper which often works out as a substantial advantage.

These machines are built by the Shaw Electric Crane Co., of Muskegon, Mich., and sold by Manning, Maxwell & Moore, Inc., New York City.

### Recent Legal Decisions

**Proving Unlawful Sale of Underweight of Coal**—In a prosecution against a retail coal dealer on a charge of willfully selling coal at an underweight, the state was entitled to prove underweights in other sales made by him for the purpose of negating a claim of mistake in the particular instance. (New Jersey Supreme Court, *State vs. Mor*, 89 Atlantic Reporter 755.)

**Amount Recoverable for Injury to Miner**—Where a coal miner established a right to recover against the company which employed him, on account of injury sustained by him in being overcome by black damp, a verdict for \$300 in his favor was not excessive, though it appeared that he was not so seriously injured as to require medical attention. (Kentucky Court of Appeals, *Mt. Morgan Coal Co. vs. Shumate*, 163 Southwestern Reporter 1099.)

**Danger Not Assumed by Miner**—A coal miner does not assume the risk of being injured on account of noncompliance on the part of his employer with a statute requiring a certain space to be provided in entries sufficient to permit drivers of cars to keep clear of the same. (Pennsylvania Supreme Court, *Smith vs. Stoner*, 89 Atlantic Reporter 795.)

**Extent of Mine Foreman's Control**—Under the Pennsylvania Mine Foreman Law, a mine operator is not liable for

injury to a person while in the mine to seek employment, even though such injury be due to negligence of a miner in failing to give warning of the approach of a car; this is a matter within the control of the mine foreman employed under the law. (New York Supreme Court, Appellate Division; *Bigus vs. Lehigh & Wilkes-Barre Coal Co.*, 146 New York Supplement 107.)



# Accident Frequency among English-Speaking Men and Others

BY HOWARD I. SMITH\*

**SYNOPSIS**—Only in West Virginia are statistics on this subject available. The Germans appear to have the highest nonfatal-accident rate and greatest proportion of accidents from falls of coal, drawslate and roof and to rank second in general fatal accident frequency. But the number of Germans employed makes the value of the result uncertain. It seems established that the Italians and negroes take less care of themselves than the American whites. While the English-speaking foreigners are too few to furnish reliable evidence, the statistics do not give them a leading place as careful miners.

The frequency of accidents among those foreigners who come from other countries than those where English and German are spoken has been repeatedly discussed, but most of the men who expressed themselves have given merely personal observations and beliefs. These, while interesting, are not convincing and facts are needed.

Statistics on this question are sadly lacking because only one state, West Virginia, has gathered sufficient figures to permit the conclusions to be drawn. A few states do classify the fatalities by nationalities, but fail to give the number of men employed from any given nation. However, on account of the compensation acts which are being considered and other important questions, the statistics bearing on this subject, no doubt, may, in the future, be more fully compiled and become available for use in attempting to improve the accident rates.

In Ohio and Pennsylvania, the number of men killed of the various nationalities have been tabulated, but not the numbers employed so we cannot draw sufficient evidence from which to establish just what nationalities are the most unfortunate.

As many of the foreign miners get their first experience in mining in this country, the following table drawn from the Chief Mine Inspector's Report of West Virginia for 1911, is of great interest:

TABLE I. LENGTH OF EXPERIENCE OF PERSONS KILLED AND INJURED AT THE WEST VIRGINIA MINES 1901 TO 1911, INCLUSIVE

	Per Cent.
Under 3 months.....	10.71
Over 3 months including 6 months.....	5.62
Over 6 months including one year.....	13.44
Total including one year.....	29.77
Over 1 year including 5 years.....	38.17
Over 5 years including 10 years.....	17.94
Over 10 years.....	14.12
Total.....	100.00
Number of men reported from which these deductions are made.....	6638

From the published report unfortunately there is no way of determining what proportions given in the above table of those killed in the several groups are foreigners or do not speak English. This table, if it represents the average conditions in the various coal fields, indicates that when the men first entered the mines they were ignorant of danger for the first period of three months, then they became very cautious during the second three-months period, at the end of which time they again become indifferent to dangers and accidents followed. The

continued decrease in the number of accidents after the first five years is probably due to the smaller number of men employed having the stated length of experience.

The following tables, Nos. 2 and 3, taken from the mine-inspectors' reports of Ohio and Pennsylvania, show only the relative number of men of different nationalities killed in and about the mines, and so we are prevented from drawing conclusions from them. These tables are, however, interesting.

TABLE 2.—TOTAL FATAL ACCIDENTS IN AND ABOUT THE MINES OF OHIO ARRANGED ACCORDING TO NATIONALITY ABSTRACTED FROM THE ANNUAL REPORT OF THE INSPECTOR OF MINES—1911

	No.	Per Cent. of Total		No.	Per Cent. of Total
American.....	49	45.0	Hungarian.....	5	4.6
Polish.....	15	13.7	Austrian.....	4	3.7
Slavish.....	12	11.0	Greek.....	3	2.7
Italian.....	8	7.3	Other nationalities..	13	12.0
Total.....	109	100.0			

Thus 49 Americans were killed and 60 foreigners and the death rate of Americans was 45 per cent. of the total whereas the rate of foreigners was 55 per cent.

TABLE 3. PERCENTAGE OF MEN, BY NATIONALITIES, KILLED IN AND ABOUT THE MINES OF PENNSYLVANIA FROM 1899 TO 1911, INCLUSIVE

	Per Cent.		Per Cent.
Americans.....	18.42	Germans.....	3.32
Slavonians.....	18.29	English.....	3.31
Italians.....	13.32	Irish.....	1.70
Polish.....	11.60	Magyar.....	1.55
Hungarians.....	9.75	Scotch.....	1.54
Austrians.....	7.59	Lithuanian.....	1.47
Russians.....	3.45	Other nationalities..	4.69
Total.....	100.00		

From page LXXXVI, Report of the Department of Mines of Pennsylvania, Bituminous—1911.

We are fortunate in finding in the mine-inspector's report of West Virginia, not only the number of fatal accidents of the different nationalities, but we have the number of men employed in and about the mines for each nationality for the years 1907 to 1911, inclusive, and from this we can figure the death by accident rate for each. These are shown in Fig. 1 and are based on a total of 317,661 man-years and 1997 deaths.

NATIONALITY	PER CENT OF TOTAL		DEATHS PER 1000 EMPLOYED			
	EMPLOYEES	DEATHS	5	10	15	20
Slavish.....	2.33	6.10	19.06			
German.....	.66	1.31	14.55			
Greek.....	.48	.91	13.76			
Italian.....	12.62	19.29	11.14			
Russian.....	1.63	2.42	10.80			
Polish.....	3.32	4.89	10.74			
English speaking foreigners.....	1.58	2.32	10.67			
Lithuanian.....	.77	.85	8.13			
Austrian.....	1.82	1.86	7.46			
Hungarian.....	.51	.59	6.71			
Negro.....	20.48	17.28	6.15			
American.....	46.81	35.77	5.57			
Other nations.....	.99	1.01	7.42			
Total.....	100.00	100.00	7.29			

FIG. 1. FATAL ACCIDENTS IN AND ABOUT MINES IN WEST VIRGINIA, 1907-1911

In the above, the nationalities of 14.27 per cent. of the employees were unknown and those of 0.60 per cent. of the men killed were also unknown. The tables were computed by discarding the unknown in each case and figuring the death rate on the number of each reported, which

\*Mining engineer, Bureau of Mines, Pittsburgh, Penn. An answer to a query in the question box of the Coal Mining Institute of America read Dec. 5 at the Pittsburgh meeting.

is higher than it should be, but the proportions will, no doubt, remain the same.

The table of nonfatal accidents is shown in Fig. 2, which is based on 317,661 man-years and 4083 nonfatal accidents. The nationalities of 14.23 per cent. of the total number of men employed were unknown and those of 0.36 per cent. of the nationalities of those sustaining accidents were also unknown. As in the previous table, the accident rate shown will be higher than it should be, but the proportions will, no doubt, follow the same order, as if they were correct.

Fig. 3 represents the death rate of the men employed

NATIONALITY	PER CENT OF TOTAL		ACCIDENTS PER 1000 EMPLOYED					
	EMPLOYEES	NON-FATAL ACCIDENTS		5	10	15	20	25 30
German.....	.66	1.16	26.30					
Slavish.....	2.33	3.89	24.88					
Russian.....	1.63	2.36	21.60					
English speaking foreigners.....	1.58	2.12	19.94					
Polish.....	3.32	4.21	18.94					
Lithuanian.....	.77	.91	17.70					
Italian.....	12.62	14.88	17.57					
Negro.....	20.48	19.63	14.29					
Hungarian.....	6.51	5.91	13.54					
American.....	46.81	41.31	13.16					
Austrian.....	1.82	1.58	12.90					
Greek.....	.48	.39	12.23					
Other nations.....	.99	1.65	24.84					
Total.....	100.00	100.00	14.91					

FIG. 2. NONFATAL ACCIDENTS IN AND ABOUT MINES OF WEST VIRGINIA, 1907-1911

in the mines who were killed by falls of coal, slate or roof, and is based on 256,058 men employed for one year and 836 deaths; the nationalities of 14.91 per cent. of the employees were unknown and those of 0.48 per cent. of the dead were also not known.

These three tables clearly indicate which nationalities in West Virginia should most need education in safety methods, but it would not be safe to assume that the same ratios of accidents to nationalities will be found in other states.

Why the death rate is higher among men of one nationality than among those of another is hard to explain. We may suppose that it is because some men are more ignorant of danger, some more awkward and clumsy, some have more of a dare-devil spirit causing them to court danger. Others, perhaps, have a pride in looking out for themselves and their fellow countrymen. Possibly men of some nationalities are naturally less methodical or careful than others, or perhaps their training at home or in school may be more deficient.

NATIONALITY	PER CENT OF TOTAL		DEATHS PER 1000 EMPLOYED								
	EMPLOYED IN MINES	DEATHS FROM FALLS OF COAL SLATE AND ROOF		1	2	3	4	5	6	7	8 9
German.....	.76	1.68	8.47								
Greek.....	.43	.84	7.52								
Slavish.....	2.78	4.21	5.78								
Polish.....	3.91	5.77	5.63								
English speaking foreigners.....	1.83	2.52	5.27								
Austrian.....	2.05	2.76	5.15								
Italian.....	12.31	15.26	4.74								
Hungarian.....	7.47	9.13	4.67								
Russian.....	1.94	2.16	4.27								
Negro.....	18.71	18.75	3.83								
American.....	45.79	34.76	2.90								
Lithuanian.....	.93	.48	1.97								
Other nations.....	1.09	1.68	5.92								
Total.....	100.00	100.00	3.82								

FIG. 3. FATAL ACCIDENTS FROM FALLS OF COAL, DRAW SLATE AND ROOF IN MINES OF WEST VIRGINIA, 1907-11

In the summary report of the Immigration Commission, we find that for 88,368 employees in the mines of the eastern and central coal fields, of whom detailed information was received, 61.91 per cent. were of foreign birth and 9.5 per cent. were of native birth but with a foreign father. Only 20.7 per cent. of the foreign-born employed had had any experience in bituminous-coal mining before coming to this country. Should we deduct from this per cent. the men from Great Britain, I believe this percentage would be lowered considerably.

# Longwall in Seams Liable to Spontaneous Combustion

BY J. E. SPICER\*

*SYNOPSIS*—Working a seam at South Derbyshire, England, where the coal is liable to spontaneous combustion. Several attempts to prevent the ignition of the coal by excluding the air from the waste proved unsuccessful, until the adoption of the longwall system of mining. Seam generates gas. Description of the method employed.

The longwall workings in the main coal seam of South Derbyshire, England, are an interesting example of the application of this method to the working of coal liable to spontaneous combustion. This seam was formerly worked by the common system of longwall advancing, the roads being maintained by well built packwalls. Much trouble was experienced by the heating of the gob, which resulted in frequent fires difficult to isolate. Attempts

Cumberland, B. C., Canada.

were made to overcome this difficulty by building continuous walls of clay, which were locally known as "wax walls." These efforts, however, were only partially successful in excluding the air from the waste and preventing spontaneous ignition from taking place. The inflammable nature of this coal together with the gas generated rendered the mine subject to frequent gob fires.

The room-and-pillar system was also tried, in the working of this seam, the pillars being removed by "lifts" or "skips," in the usual manner. Several serious fires occurred, in the use of this method and, as a result, strong stoppings of brick or concrete had to be built and a portion of the mine indefinitely abandoned. The method of longwall retreating that I am about to describe proved the most successful process that has been thus far adopted, in the working of this seam. It is the method by which the seam is worked today.

The accompanying illustration (Fig. 1) shows a vertical section of the main coal seam to which I have referred.

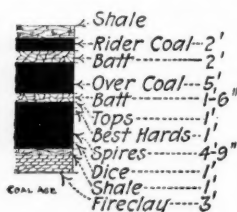


FIG. 1. VERTICAL SECTION OF COAL SEAM

The workable portion of this seam is included between the fireclay and shale that forms the floor and the "batt" underlying what is called the "over coal." These several strata are shown in the section. The over coal, which is 5 ft. in thickness, is of inferior quality and is generally left in to form the roof in the first working. Sometimes, however, the lower coal is only taken out to the

"tops," which forms a good roof and saves the handling of the "batt" just above it. The "best hards" being of splendid quality is loaded separately. The fireclay, forming the floor of the seam, is also worked, to some extent, and is used for brick-making, this industry being carried on largely in the district.

While the coal itself remains fairly regular, over a large area, maintaining its average thickness and quality, the other strata vary considerably. For example, the batt underlying the over coal varies from 6 in. to 4 ft. in thickness. This feature practically decides the question of whether or not the "tops" should be taken down in the first working.

The general plan adopted in the working of the main coal seam is illustrated in Fig. 2. Parallel headings are first driven in the coal, from 9 to 12 ft. in width, and from 90 to 120 ft. apart. These headings, which serve as haulage roads, are connected by crosscuts of the same width. The crosscuts, which are driven for ventilation, should be as few in number as possible. On the plat they are shown 50 yd. apart. Owing to the thickness of the intervening pillars, the driving of the crosscuts is expensive; and, furthermore, when retreating, they are apt to cause heavy caves or roof falls.

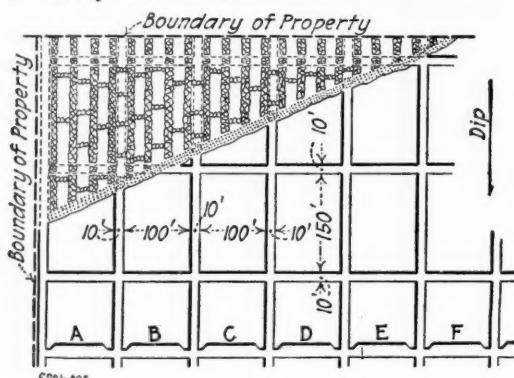


FIG. 2. PLAN, LONGWALL RETREATING

The headings are driven right to the boundary line or the extent of the property, before the longwall face is commenced. As a precaution against spontaneous combustion in the waste, all the slack and small coal are loaded out of the mine. This greatly reduces the chances of mine fires occurring in the waste.

The seam gives off a quantity of marsh gas ( $\text{CH}_4$ ); but, for the most part, the gas drains from the pillars, during the first working. Drill holes are put up in the roof, at intervals, to allow the gas to drain from the overlying strata. It is necessary, in order to prevent the accumulation of gas in any portion of the mine, to main-

tain a strong ventilating current, which is made to sweep the working faces, the circulation being assisted by secondary fans where that is necessary. The strong air current is all the more important, because of the presence of gas and the possibility of fire starting in the waste, which presents a serious and dangerous condition.

As shown in Fig. 2, as the headings reach the boundary line, in continuous succession, the longwall face is extended. It is important to keep this longwall face in a straight line running at an angle with the heading, in order to reduce to a minimum the possibility of a cave cutting off a considerable length of the working face at one time. This would be very apt to occur, if the face were made to run square across the pillars.

During the work of retreating, as the coal is extracted, packwalls are built 9 ft. wide, with 18-ft. wastes between them, except at the headings where the waste space is narrowed to a width of 12 ft. The packs are built of coal taken from the interior portion of the seam, the interstices being well filled with sand or flue dust, which would tend to extinguish any fire that might occur in the mass. This system is continued as long as the roof holds good; but if a cave should occur in the waste, the place is built off by a packwall 6 ft. wide, which is made as tight as possible to exclude the air.

The timbering consists mainly of posts set in rows 5 ft. 6 in. apart, the posts in each row being spaced the same distance, center to center. Two rows of posts are set in each crosscut, and three rows at the longwall face, the third row at the rear being drawn and set forward as the face advances. These are not shown in the figure. The headings require to be well timbered, since they are weakened by long standing. As shown in Fig. 2, the headings are driven to the rise. As shown also in Fig. 2, at A, B, C, etc., the plan was adopted, at one time, of widening the crosscuts, a short distance from the heading. The crosscuts were widened to 15 or 20 ft., but the plan proved to be bad policy, as it was more expensive and caused heavy caves when reached by the retreating longwall face. These caves cut into the longwall face so badly that the plan had to be abandoned.

### Coming Mine-Safety Field Meets

The United States Bureau of Mines is being continuously called upon to lend its coöperation in various field meets and contests in first-aid and mine-rescue work. The following field meets and contests have been called to the attention of the bureau within the last few days:

April 25: Ironwood, Mich. Gogebic Range Mining Association. O. E. Olsons, Sec.-Treas., Ironwood, Mich.

May 2: Harrisburg, Ill. Saline County Mine Safety Association. Oscar Cartledge, Springfield, Ill. Chairman, Program Committee.

May 9: Lexington, Ky. Kentucky Mining Institute and Kentucky Mine Operators' Association. C. J. Norwood, Program Committee, Chairman.

May 13-15: Bluefield, W. Va. West Virginia Medical Association and Pocahontas Coal Operators' Association. Mr. Tierney, of the Powhattan Coal & Coke Co., and Mine Foreman Henson, of the United States Bureau of Mines, are planning such a meet in correspondence with Dr. A. P. Butt, of Davis, W. Va. Details not definitely settled.

May 18: Fort Smith, Ark. W. D. Ryan and J. J. Rutledge, of the Bureau of Mines, are arranging this meet.

May 21: McAlester, Okla. W. D. Ryan and J. J. Rutledge, of the Bureau of Mines, are arranging and will probably attend.

May 25: Pittsburg, Kan.

May 28: Moberly, Mo.

June 1: Des Moines, Iowa. (This date and place in Iowa may be changed later.)

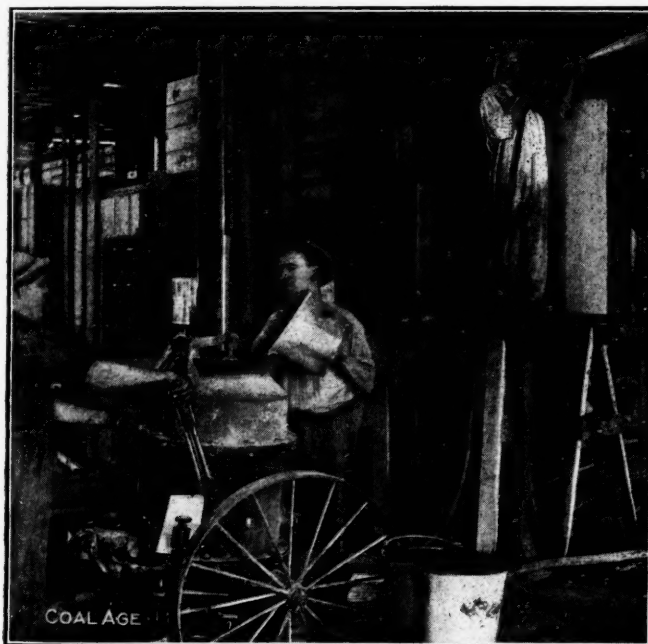


# Availability of the Cement Gun for Mine Work

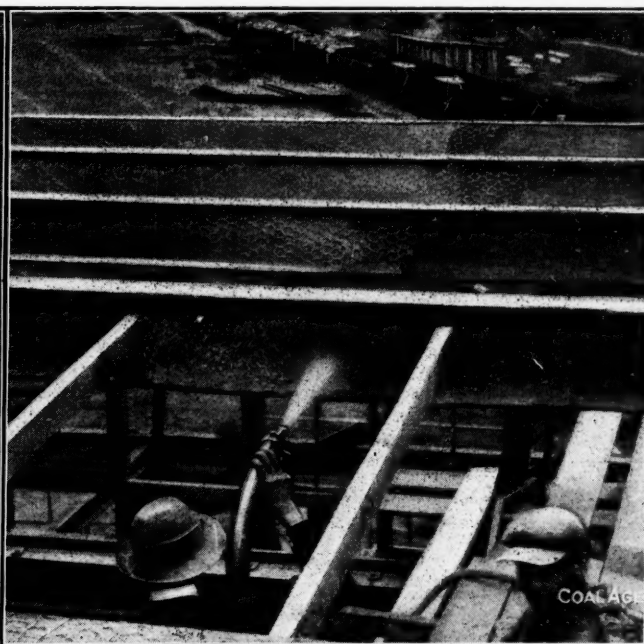
**SYNOPSIS**—The cement gun deposits cement mortar by an air blast mixing the water with the dry ingredients at the delivering nozzle. The material formed is known as gunite and is denser and stronger than ordinary cement mortar or concrete. It is well suited for making buildings fireproof and permanent, and for coating head-frames, timbers and mine roadways. It could also be used with advantage for stoppings and overcasts.

The cement gun has been described before in these columns† but its availability for the specific uses of the mine owner were not indicated. It is probable that it

parts marked *A* and *B*, the latter being kept constantly at a pressure of 45 lb. Before *A* is loaded, the air in it is allowed to escape. The small cone is lowered by lifting the handle and the dry mix falls into the cylinder *A*. The cone is then lifted and air under pressure is admitted. The inverted cone *C* becomes tightly seated and as the pressures in *A* and *B* become equal the inverted cone *D* can be lowered permitting the charge to fall into cylinder *B*. On raising the cone *D* by the handle, a cycle of operations is completed and the upper cylinder is ready for depleting of air and recharging with a new batch of mix. In this way continuity of operation is insured with



CEMENT GUN BEING USED TO COAT INTERIOR OF BUILDING



GUNITE BEING DEPOSITED ON STEEL WORK. NOTE REINFORCEMENT

would make slow headway in underground mining work regardless of its intrinsic value for such purposes were it not for the fact that it is a most desirable piece of equipment for outside mine uses. Once purchased by mining companies for surface work, it is likely to be rapidly introduced below ground for compressed air is frequently available and the height of a low machine 4 ft. 8 in., and its width 3 ft. 1 in. make it readily suitable to movement from place to place. When this machine, weighing only 1500 lb., is tilted, its height is the same as that of the wheels, namely 36 in. Consequently it can be taken almost anywhere.

## MANNER OF OPERATION

The cement gun practically consists of a cylinder for storing dry cement mortar, a feeder for delivering measured quantities to an opening which quantities are driven by air pressure through a hose line till they reach a nozzle where they are hydrated by a water hose just before they emerge into the air.

The storage chamber must necessarily consist of two

only one machine feeding the nozzle, the work not being stopped during the charging of the hopper.

## HOW THE CHARGE IS HYDRATED

The feeder *K* is kept revolving through a spur- and bevel-gear train by the air motor *E* on the rear of the truck. It delivers intermittently yet with frequency at *R*, through the valve *H*, a measured amount of dry mortar from the storage chamber *B*. This is discharged under pressure by the air and passes through hose of pure soft rubber covered with heavy canvas. This is of any necessary length, and may be 300 or even more feet long.

On reaching the nozzle to which water is admitted from the pipe *P* by the valve *V*, the mix is thrown into the air in a concentrated stream at a speed of 110 ft. per second. The material is now hydrated for the first time. There is, therefore, absolutely no set in the mortar when it reaches the place of deposit.

There can be no question as to the amount of water to use. It must be sufficient to cause the mortar to adhere without running. If enough water is not added the

†May 11, 1912. Vol. 1, p. 1011.

gunite will not stay in place and the dust formed will inconvenience the nozzleman so that he will be sure to increase the supply. If too much water is used, it is expelled automatically by the force of the impact. The air also which might be expected to render gunite a scoria-like mass of cement bubbles, creates a material more dense than the best mortar owing apparently to the violence with which the mix is projected against the face to be coated.

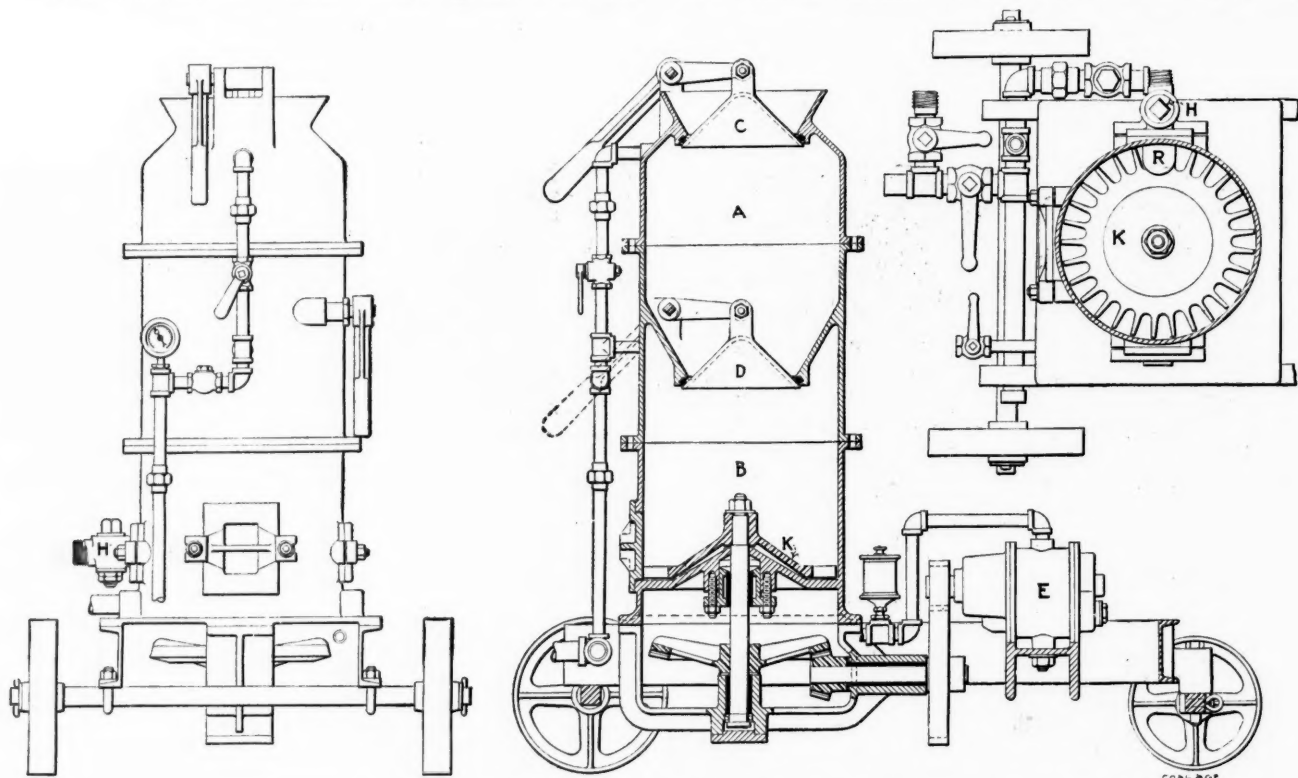
#### SURFACE COAT OF PURE CEMENT

When the mixture is first thrown against a surface,

before they are driven. After the gunite has been hardened, they will then bear driving by a 3000-lb. hammer to a 20-ton bearing.

#### PRECAUTIONS AGAINST WEAR OF HOSE

The hose, couplings and nozzle of the cement gun must be suitable or the wear will be rapid. The couplings fit on the outside of the hose so that there is a continuous lining of rubber. The nozzle also is lined with the same substance, to defend it against abrasion. This is necessary because there is a certain diameter of nozzle suited to a definite diameter of hose and if much wear took



ELEVATIONS OF ORIGINAL MODEL OF CEMENT GUN, MOUNTED ON FOUR WHEELS

the sand fails to stay in place. Only pure cement will stick until the body is coated with that material. But the rebound of sand immediately ceases and the mortar begins to adhere as a whole, building grain upon grain. In this way there is no contact between the sand and the material coated. Every grain of sand is attached by a coating of cement to the reinforcement or backing.

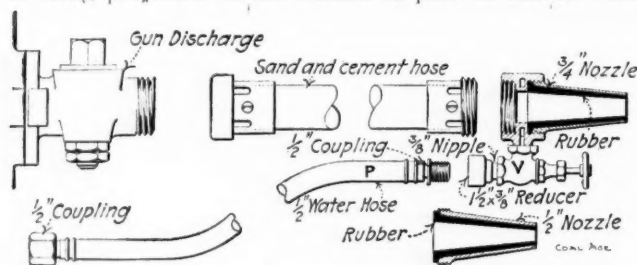
Engineers who have been specifying that such a coating of pure cement be placed on all surfaces, before making an addition to work after a delay in building up a concrete structure, will appreciate the value of this automatic selective action of the cement gun and will realize why gunite holds with a grip of iron so strong that it is being projected on the surface of piles in harbor work

place the loss of air would be considerable. The nozzle is made with an annular ring at its larger end. The water is admitted to this ring, and is permitted to enter the outflowing stream of mortar by perforations in its periphery. Straight steel pipe may be used to transport the mix but on curved sections, rubber-lined hose is essential because a curved-steel pipe will wear out in a few hours' time. The rubber lining of the nozzle will last from one to three weeks. The material hose is from 1 to 1½ in. inside diameter and the hose delivering water to the nozzle is ½ in.

The cement gun does not use much air. All that is needed is about 150 cu.ft. of free air per minute compressed to 45 lb. pressure, which is sufficient for the working of a gun at a capacity of 1½ cu.yd. of dry mortar per hour. A larger volume of air at a higher pressure will speed the machine up to 3 cu.yd. per hour.

#### GUNITE IS A SUPERIOR GRADE OF CEMENT MORTAR

As stated, gunite is superior to cement mortar as prepared by ordinary methods for there is no incipient set before placing; its adhesion is superior and its density a maximum. The report of Westinghouse, Church and Kerr shows that gunwork excelled handwork from 20 to 260 per cent. in tensile strength, 20 to 720 per cent. in



DETAILS OF MATERIAL AND WATER HOSE

compressive tests, 43 to 1900 per cent. in surface impermeability, 40 to 430 per cent. in resistance to water absorption, 33 to 92 per cent. in the volume of voids, 27 per cent. in adhesion and 12 per cent. in weight.

Hence, the only question as to whether to use gunite is not one of quality but as to the amount needed to justify the employment of a machine, for the price of application is lower than with handwork, and the coating being stronger need not be so thick.

#### SUITABLE FOR REFACING MINE BUILDINGS

Gunite can be used for a great many purposes among others for coating frame houses. This makes them warmer, drier, stiffer, more fireproof and more permanent. The illustration shows the little town of Elba, N. Y. In 8 days, 15 houses were covered with a 1 1/4-in. covering of cement mortar. The actual time occupied was only 60 hr. 40 min.

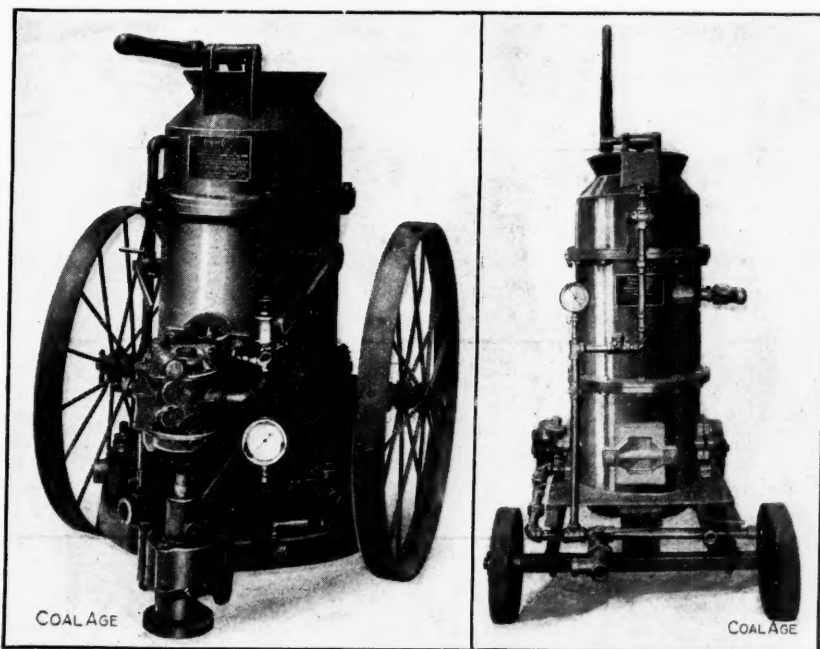
Better results could have been obtained had the coating been only 3/4 in. thick instead of 1 1/4 in. However, 7/8-in. furring had been supplied instead of 1/4 in. and the thickness could not be kept down to the preferred figure. Small-mesh expanded-metal lath was used as reinforcement.

To perform this work the following labor was used: 1 gunman at \$2.50, 1 nozzleman at \$2.50, 1 foreman at

even coat is desired, there is no need for a skilful operator. The quality of the gunite is the same when made by a novice or a competent man.

#### GUNITE MAY BE USED TO COAT STEELWORK

It is a desirable coating for steel tipples, headframes and bins. Being so impervious it protects the steel most



THE MORE RECENT TYPE OF MACHINE  
SUITED FOR MINE WORK

THE ORIGINAL TYPE ON  
FOUR-WHEEL TRUCK



A GUNITED VILLAGE AT ELBA, N. Y.

\$3.50, 3 laborers at \$2, 1 engineer at \$2.60, 2 plasterers at \$5.50, the latter being union men. The total payroll per day was \$28.10. In all, 1402 sq.yd. exclusive of openings, were covered at a labor cost of 14.2c. per sq.yd., using 434 bags of cement and 44 cu.yd. of sand. This figure, we are assured, is somewhat high for cement-gun work, the labor costs ranging from 8c. to 16c. per sq.yd., according to circumstances.

This method of coating houses inside and out is well suited for use in the building and repairing of mine villages. It can be used for power houses, office buildings and barns. If a fine finish is not needed, the employment of plasterers is unnecessary and except where an

effectively. Ordinary concrete of as lean a mixture as 1 to 9, can be filled in the heart of the box columns. The exterior of these can be encircled with reinforcement and coated with gunite. If desirable, however, this reinforcement can be used only on the top and bottom flange and the gunite be used to coat the flanges and web as shown in C in the illustration on the succeeding page.

Gunite can also be used for tanks and reservoirs and for such purposes its imperviousness is strongly in its favor. The Twin Peak Reservoir at San Francisco is used partly for water storage and partly for an auditorium. When first built, it leaked at the divisional wall, but it was coated with a coat of gunite 1/4 to 1/2 in. thick and now is water-tight, yet the head of water on the base of the wall is 27 ft. The cement gun would serve for coating boiler settings, making them impervious to the air. The coat might crack from the heat after a while but such destruction is to be expected of all such coatings and can be repaired.

#### USE UNDERGROUND

Gunite can be used for fireproofing, drifts, mine roadways and stables. Where it is desirable to place a dividing wall between compartments in a shaft, the use of the gun is to be preferred, especially as the delivery of the material is conveniently effected through the medium of a hose.

It seems remarkable at first how largely gunite is used in connection with something so temporary as timber. Yet when we remember that it is cheaper than cement plastering, the reason is evident. Where it is desirable to secure a life for timber sets inferior perhaps to iron,

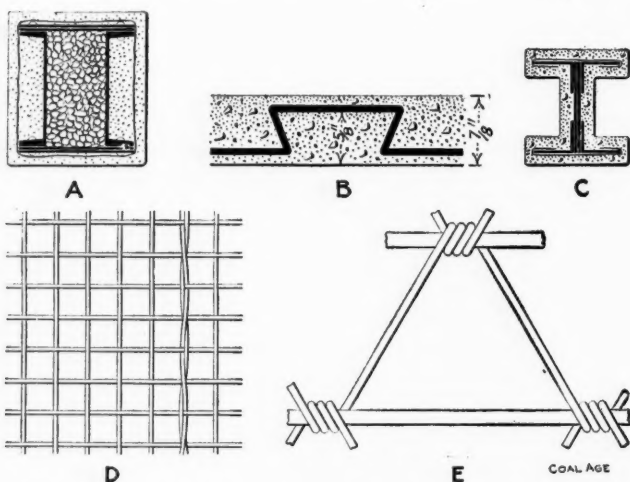


but greater than that of ordinary timber, the roof, ribs, sides and timbers could be coated by the cement gun, wire reinforcement being placed around the timbers and the posts being supported on a concrete footing. All this could be arranged without removing the timbers and so bringing down perhaps much of the roof.

When the roof tends to fall from oxidation or moisture, the cement will give it a permanent coat which will resist further weathering. It will not, of course, serve where the pressure is severe and the coal ribs are insufficiently strong.

#### BRATTICES AND STOPPINGS

Guniting could well be used for stoppings and overcasts. For the purpose ferro-inclaves reinforcing would be most desirable as it is not a mesh but a thin plate. Conse-



#### REINFORCEMENT FOR GUNITING WORK

A, box column filled with 1:9 concrete wound with reinforcement and coated with guniting; B, ferro-inclave coated with guniting, suitable for new brattices; C, an I-beam with flanges covered with reinforcement and entire surface covered with guniting; D, Clinton electric welded wire; E, triangle mesh American Steel & Wire Co.

quently, the guniting forms without difficulty on its face and back. The brattice could be made about  $\frac{7}{8}$  in. thick.

When wood brattices have to be replaced throughout the mine, thin cleats could be nailed on their faces and on these spread and nailed some form of reinforcement such as Clinton electric welded wire, 4x4x12x12 in., or the 7 or 7a triangle mesh of the American Steel and Wire Co., or larger expanded metal lath of some sort. When strength is not so necessary, poultry wire will serve instead of the more expensive reinforcing. Where brattices are to be built in front of old wood stoppings, the

TABLE OF AIR REQUIREMENTS, CAPACITIES AND RESULTS OF THE CEMENT GUN

Duty per day $\frac{3}{4}$ in. coat, sq.yd.....	245	254	305	407	762
Duty per hr. $\frac{3}{4}$ in. coat, sq.yd.....	30.9	31.7	38	57	95
Duty per day $1\frac{1}{4}$ in. coat, sq.yd.....	147	152	182	243	456
Duty per hr. $1\frac{1}{4}$ in. coat, sq.yd.....	18.5	19.0	22.8	30.4	57
Number of nozzles used.....	One	One	One	One	Two
Diameter of nozzle, in.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Average air pressure at gun, lb. per sq.in.....	30 to 35	38 to 40	40 to 45	50	30 to 40
Interior diameter, material hose, in.....	1	1	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Free air supplied compressor, cu.ft. per min.....	110	135	150	175	210*
Rated delivery passed through gun, cu.ft. per hr.....	25	35	40	50	85
Actual delivery.....	20	25	30	40	75

Note:—Results obtainable with the cement gun are affected by elevation above sea level, moisture and temperature of the air, quality of sand and its contained moisture, mechanical efficiency of compressor and the length of the transmission hose. The figures in this chart are based on an 8-hr. day, a 1 to 3 mixture of cement with sand and 100 ft. as average length of material hose.

\* Air used for material hose only. Feed wheel driven separately by electricity.

cement gun can then be used on one side only and the coating will cover the wire complete. It would be easy to make this cement work fit tightly to roof and floor whereas it is hard to connect poured-concrete work to the roof.

The mix is usually one part portland cement to three parts of coarse sharp sand passing through a  $\frac{1}{4}$ -in. screen. Other compositions may be used, however, and hydrated lime, suitable coloring material or any other ingredients may be added such as are used with ordinary cement mortar without injury.

The preceding table gives data on which the performance of the cement gun may be estimated.

The Cement Gun is made by the Cement Gun Co., Inc., of 30 Church St., N. Y.

### The Traitor

BY BERTON BRALEY

Written expressly for Coal Age

He was a walking delegate,  
A canny labor leader,  
Exceeding clever in debate,  
A smooth and ready pleader;  
The miners thought him keen and wise,  
To place and power they thrust him,  
He was a hero in their eyes,  
They thought that they could trust him.

But he was full of guile and craft,  
A wiz at dealing double,  
He held the owners up for graft,  
He made the miners trouble,  
The tricks he worked, the lies he spun  
Would fill a lengthy docket,  
For he looked out for Number One,  
And blithely crammed his pocket.

He was a traitor to his cause,  
Betraying friend and neighbor,  
And breaking faith and breaking laws,  
All in the name of Labor,  
HE didn't care if famine came  
And want and woe were showing,  
For men were counters in his game  
To keep his bankroll growing.

Yet when this foxy boy was caught  
With all the graft he'd looted,  
The workers cried, "'Tis as we thought'  
Our leader's persecuted!"  
And 'spite of proof and evidence  
Of all his sales and barter,  
And in the face of common sense  
They made him out a martyr!

**Rights under Illinois Mine Safety Law**—The fact that the examiner of an Illinois mine had not marked a clod in a roof warranted a miner working under it in assuming that the examiner deemed the place safe, and the miner was not guilty of contributory negligence in remaining at work there. The coal company cannot escape liability for injury resulting from fall of the clod, because general instructions had been given employees in clearing out the mine to make all places safe. This precaution did not obviate the necessity for having the mine inspected and dangerous places marked, as required by the Illinois statutes. (Illinois Supreme Court, *Piazzi vs. Kerens-Donnewald Coal Co.*, 104 N.E. Reporter 200.)

## Automatic Safety Mine-Car Cagers

By E. G. BANTA\*

"There is a path which no fowl knoweth and which the vulture's eye hath not seen; the lion's whelps have not trodden it nor the fierce lion passed by it."

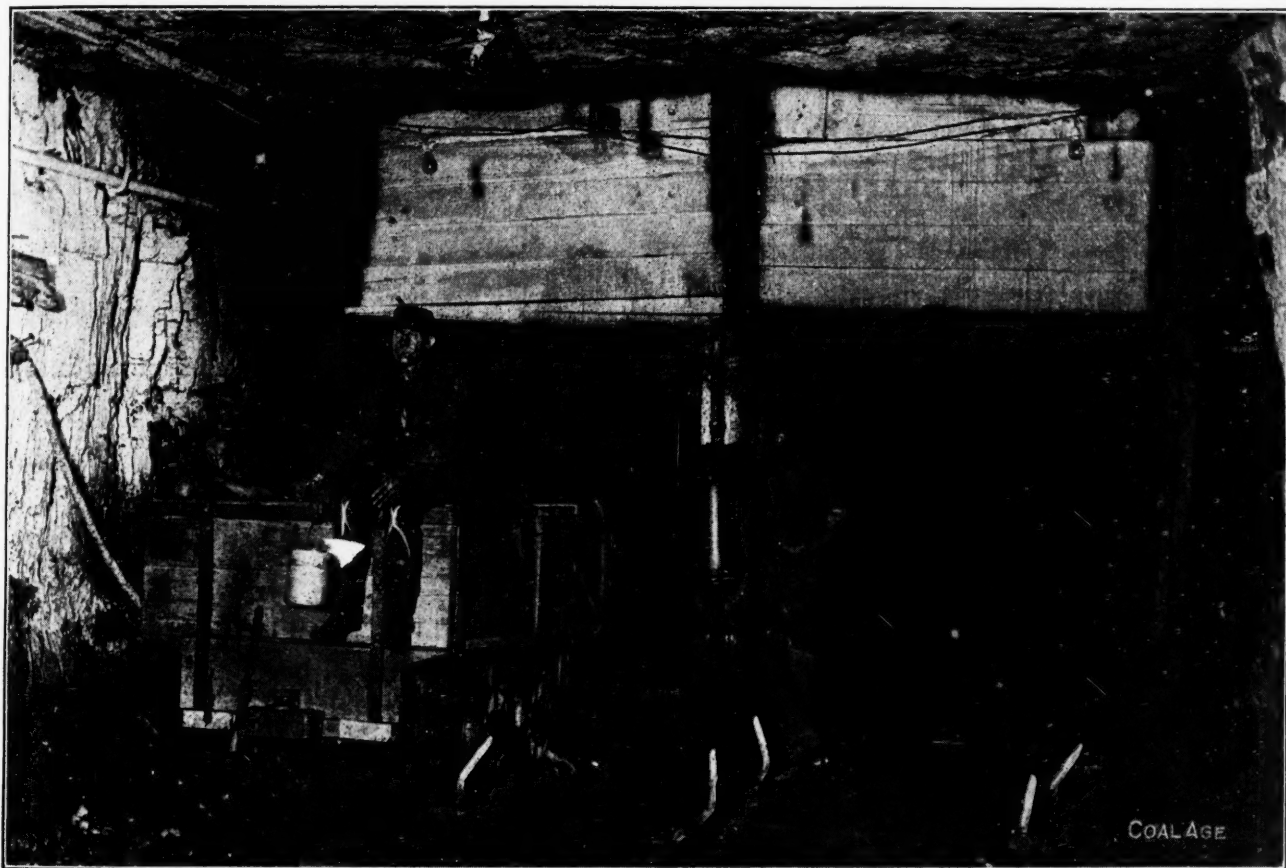
So wrote the inspired writer as recorded in a portion of Job; 28. Today the underground channels so vividly pictured in the chapter, as partly quoted above, honey-comb the earth in various localities for many miles and in the central bituminous district alone many thousands of men are employed in producing coal.

upon to always be at their places in the mine, accidents would be reduced materially but the human element is uncertain and unreliable.

One man takes sick and a green hand is substituted with resulting delays, accidents and wrecks. Another becomes careless, with similar results.

Quick, accurate caging, coupled with speed in hoisting assists materially in increasing the output of any mine and is necessary to the constant employment of those who operate the coal cutters and load the cars.

The accompanying illustration shows the shaft bottom at one of the mines of the Superior Coal Co., at Gillespie, Ill., equipped with an automatic safety mine-



AN AUTOMATIC CAGER IN THE MINE OF THE SUPERIOR COAL CO., AT GILLESPIE, ILL.

As in every other industry, machinery is being used more and more either to largely increase the working power of man or to safeguard him against the many accidents peculiarly incident to the production of fuel.

Many of these accidents occur in the handling of the cars at the shaft bottom and upon the tipples and inclines of the modern mine where whole trips frequently get beyond control of the workmen, expert though they are, and either pile up in the sump or run wild over the edge of the tipple, falling to the ground below.

In hoisting, coal is shaken from the car and falling down the shaft breaks hands, wrists, arms and heads of the men engaged in placing cars upon the cage.

The human body has its limitations and increased tonnage means not only additional labor for the men already employed, but an actual increase in their number. If all men so engaged were skilled and could be depended

car cager, manufactured and marketed by the Mining Safety Device Co., of Bowerston, Ohio.

This cager is a single but effective automatic device, which installed at a shaft bottom does the work of the usual cagers, by taking the cars from the trips, one at a time, and placing them on the cage, accurately, safely and speedily. At the Nokomis (Ill.) mine of the Peabody Coal Co., these machines are feeding two cars, side by side, to the same cage.

In connection with these automatic cagers the same company is marketing a combination of automatic stops and angles which lock the car in position for hoisting.

These equipments are now to be found in mines in both the anthracite and bituminous districts of Pennsylvania, in West Virginia, Ohio, Indiana, Illinois, Iowa, Colorado, Alabama, Kentucky and Canada. It is claimed that their use is resulting in an actual saving in the handling of the cars of from 1/2c. to 1c. per ton.

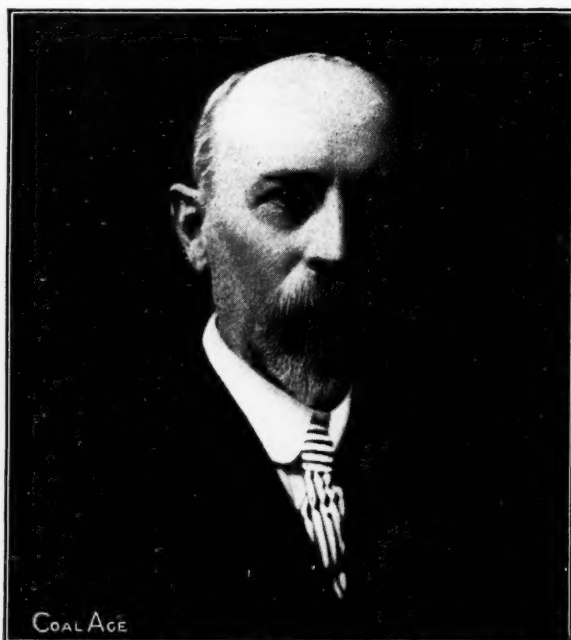
\*412 Fairbanks Bldg., Springfield, Ohio.

## Who's Who in Coal Mining

### Edward V. d'Invilliers

Edward V. d'Invilliers is one of the foremost mining engineers and geologists in the United States. He was born in Germantown, Penn., Aug. 2, 1857. After attending a military school, Mr. d'Invilliers entered the University of Pennsylvania, from which institution he graduated with the degree "Bachelor of Science," in 1878. In 1913 his *alma mater* honored him with the degree "Doctor of Science."

Since becoming actively engaged in engineering and geological work, Edward d'Invilliers has made reports for some of the largest mining interests in America. His geological investigations of coal and ore measures in



EDWARD V. D'INVILLIERS

various states are particularly notable. He is at present a member of the Pennsylvania Topographic and Geologic Commission, and has contributed largely to the work published by that body. Some of Mr. d'Invilliers' contributions have appeared in the transactions of the A. I. M. E., the Geological Society of America and the Engineers' Club of Philadelphia. One of his most extended examinations covered the Pittsburgh coal region. Another important investigation, conducted by Mr. d'Invilliers, dealt with the iron ores and limestones of the Cumberland Valley.

He is a member of the Mining and Metallurgical Society of America, A. I. M. E., the Geological Society of America, the American Philosophical Society and the Franklin Institute.

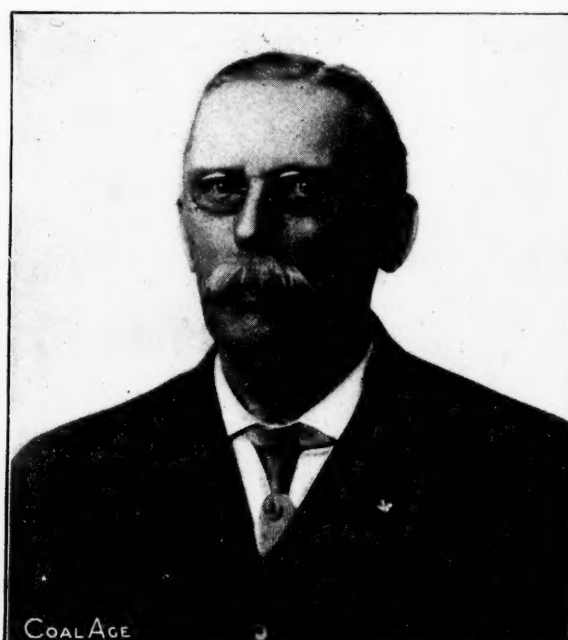
Mr. d'Invilliers continues in the practice of mining engineering and geology, having his office at 518 Walnut St., Philadelphia, Penn.

### William Haven

William Haven is one of the leading coal operators in Iowa. He was born at Portsmouth, N. H., Nov. 11, 1845, and graduated from Norwich University, in Vermont, with the degree "Bachelor of Science" in 1863.

In 1869 Mr. Haven went west to Illinois and had charge of the construction of a section of railroad for the C., B. & Q. R.R. His connection with the coal industry of Iowa commenced in 1870, when he was placed in charge of three mines of the Union Coal & Mining Co. as assistant superintendent.

A few years later he organized the Whitebreast Coal & Mining Co. and was elected president of this corpora-



WILLIAM HAVEN

tion. On account of the good marketing facilities and excellent quality of the product, this company, for several years, was the largest shipper of coal in Iowa.

In 1882 Mr. Haven sold his interest in that company, at the same time agreeing not to engage in the coal business in that district for ten years. It was not until 1897 that he again entered the coal business, organizing what is known as the Inland Coal Co. This concern soon developed much territory in the Lucas County field, of Iowa, and placed the coal business of that section on a more substantial basis than ever before. Although the Inland Coal Co.'s mines were recently sold to other interests, Mr. Haven will be remembered as the pioneer operator of that particular field.

He is still a member of the Iowa Coal Operators' Association and deputy governor of the Iowa Society of Colonial Wars.



## Editorials

### One Way to Introduce Your Coal

"And there is no new thing under the sun." Possibly not, but here is an interesting variation.

A coal-mining company in Alabama has purchased a large quantity of coal scuttles and on each of these buckets they have had printed in artistic lettering, the name of their coal and a statement that it contains little ash. These buckets are now being sent out gratis to the various retail coal dealers who handle this particular coal exclusively, with the request that the buckets be filled with coal and distributed free to the households that are in the habit of buying their coal in small quantities from retail coal yards. The entire expense of filling the buckets with coal is borne by the wholesaler.

Brands of tobacco, baking powder, tooth paste and soda crackers have all been introduced in this manner; why not coal?

✽

### Manyana

The state of Pennsylvania is said to be still in existence and it is credibly reported that in 1912 it put some coal on the market, at least E. W. Parker so states, and he ought to know. But so far we have no state report of production and now we learn the hindery of C. E. Aughinbaugh, where the state publishes its belated reports, is burned down.

A part of the issue of Smull's legislative handbook for last year is destroyed and it is proposed that efforts be concentrated on the issue of 1914, which should have been published early in the year. We think this ill-advised and suggest that work be commenced on the entire bulletin issue of 1916, so that there may be no failure when that year arrives. Our attitude on the momentous issue is one of "watchful waiting."

✽

### The Operators of Central Pennsylvania

It is pleasing to note that the operators of central Pennsylvania have showed a disposition to meet their men and discuss the wage scale at the earliest possible moment. We confess we did not like to see a body of mine owners laying off their men because these men, not even suggesting a strike, asked for something which would involve the former in expense.

We are not accustomed to discharge, or even to suspend for ten days or two weeks that foolish employee who thinks he is entitled to a "raise." We usually discuss the question with him, and if we think he is not entitled to his demand, we are firm. He is no criminal that we should make him suffer and his family in the old-fashioned pre-Mosaic manner.

We are glad to acknowledge that there was no pressure of one operator on another to make him perpetrate

so signal an injustice. Those who could not see clearly the falsity and the humor of the situation did not press their construction of what was appropriate on others.

On going to press, we understand that the men and operators are to meet at Clearfield, Penn., about Apr. 23 and it is sincerely to be hoped that their session will soon result in industrial peace. The demands of the men are reasonable and in accord with the present trend which would replace manual labor by mechanical, or at least animal power, but the miners cannot expect that this change will be made at the expense of operators, having to meet such competition as exists in Pennsylvania.

The list of bankrupted companies is too long and would be longer if a little such pressure were brought to hasten insolvency. If pushing cars is such an affliction, as indeed we agree it is, let the miners accept a reduction per ton mined in return for its abolishment and load a few more cars per year to recoup themselves.

District concessions are inconceivable where competition is so fierce. Inequalities usually exist only because such differences in scale are essential to the life of the industry in the region receiving them. There are, of course, large exceptions, and where such exist, the profits made in that section flood it with operators and raise by lowered price and increased royalties, barriers to wage adjustment which soon become insuperable.

✽

### One Great Item of Cost in Mining

Few people realize the heavy expense incurred by the hard-coal companies in their efforts to keep the anthracite mines dry. The latest estimate of the Pennsylvania Department of Mines places the total capacity of the pumps below ground in the anthracite field at more than 3400 tons a minute. This means that they are capable of pumping nearly 1,800,000,000 tons of water per annum.

At the present time these pumps are actually handling approximately 951,000,000 tons of water each year. Thus thirteen tons of water are lifted for every ton of coal mined. Such a quantity of water would fill a canal 10 ft. deep, 100 ft. wide and 4600 miles long.

At some collieries water is hoisted as well as pumped to the surface. In a shaft at Hazelton, a 2000-gal. tank (7.4 tons) is hoisted 95 times an hour. In the Pottsville region tanks holding 3000 gal. (11 tons) are in use. In the northern anthracite field, near Scranton, there is one mine where twin tanks are used, and 5100 gal. of water are hoisted each minute. In addition to the twin tanks at this mine, there is a 1000-hp. pump continually at work. This pump raises a column of water 16 in. in diameter 460 ft. in one minute. A modern pumping plant today costs from \$25,000 to \$30,000. Such an installation will discharge to the surface about 7000 gal. per minute.

The D., L. & W. collieries pump from 7,000,000 to 13,000,000 gal. per day, and at some of the operations of

the Susquehanna company, 9.3 tons of water are hoisted for every ton of coal. The Pennsylvania Coal Co. raises 7 tons of water for each ton of coal, the Delaware & Hudson Co., 14.3 tons, the Lehigh Valley Coal Co., 15 tons, and the Philadelphia & Reading Coal & Iron Co., 12 tons.

Facts of this nature furnish food for thought on the part of the public who complain about the high cost of their domestic fuel. The price of coal on board of cars at the mines today is very low when we consider the hazards of mining and the difficulties of production. One thing is certain, the mining companies themselves are not making an excessive profit from their operations. If the railroads and the retailers are securing more than is their due, the public should endeavor to adjust matters, commencing at the proper end. If an evil exists in the coal business, the blame should lie on the party at fault.

✠

### Rules, General and Special

Of all harmless phylacteries none are better opiates to conscience than the rules, general and special in many languages when we nail up on our tipples as men used to bind the Torah on their temples.

No one reads them and like the "speeches" of our statesmen, they are taken as read. We cannot blame any one, for these mandates are assuredly the driest of reading and men who rarely read or who read only with difficulty, will not spend the time to look them over.

But these rules should surely be read most carefully and we believe that the best way to contrive that this may be done, is by having them typewritten, one by one, month by month, and posted as bulletins. By using a different color of paper, interest would never fail. The little screed might be taken for a notice of a dance, a prize fight, a union meeting or a church gathering. Most probably everyone who could, would read it especially if it were written in every language which the typewriter can print with a little help. We except, of course, from such a list of tongues, Greek, Chinese and Japanese.

No one can accept a hundred instructions at one time. They are best brought to the attention of the workmen one by one, and though to comply with the law, the rules still continue to be posted, there is no reason why they should not be publicly displayed in the manner suggested. In doing this, of course, the leading mandates can be quoted first.

A few of the "Don'ts" from the Bureau of Mines' Bulletins and from technical journals are suitable for publication in this manner. It would be well to quote the authority by which they are indorsed. We all are more mindful of the advice of strangers and of the regulations of governmental authority than we are of the rules of those whose follies and foibles we know too well. After all the objection of those who oppose safety regulations is often not so much to too much safety, but to too much Smith. They dislike advice and orders less than they do the adviser and disciplinarian.

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### The 100-Per Cent. Union

There seems a strong objection on the part of some coal operators to a 100-per cent. union in which they imagine all their miners are banded together against them. They rate abstention from union counsels as a sure proof of the friendliness of their men and look upon activity as a sure sign of discontent.

With this view of conditions, we would most strongly dissent. We can understand the man who would prefer to employ only nonunion men, but we cannot comprehend the attitude of the operator who, in recognizing a union, desires to have to deal solely with those to whom his wishes are anathema.

Better by far for him that the union draw into the fold, all those reasonable souls who believe that the domination of capital is an easy yoke, compared to the burdens which would be imposed on the world if the negligent, inefficient, discontented and visionary occupied all the high places. Far better is it that he should meet in debate, the average, composite intelligence of his men, rather than merely those who believe that the world is all wrong and that he is a chief among wrong doers.

It is the best wish for him that the union shall be representative of his men in the mass as the political ballot records or should record the composite judgment of all shades of opinion. In fact, he needs that the ferment of irresponsibility be toned down with those elements of society which perhaps lean in the direction of inertia.

When we hear men boast that the union contains but half the men, we are disposed to presage trouble for such operators rather than peace, for it is likely that at least half of these union men are factious by temperament and regard the union, not as a place of defence, but as a sally port of defiance. On the other hand in a union 100 per cent. strong, probably at least 75 per cent. of the men are approachable by justice and reason, and desire agreement rather than invite dissent.

We are not advocates of the closed shop because in our opinion, such a condition violates the rights of individuals to combine or refrain from combining at their pleasure. Nevertheless, granted that the men desire to amalgamate as a unit to make a collective bargain, we see in that unity, a guarantee of the operator that he will have to deal, not with an unreasonable body, but with a safe and sane aggregate of reflecting men.

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### The Saloonstead

Last week under the title "Conservation," we called attention to one of the unfortunate results of the present Western land laws. We wish today to direct the thoughts of our readers to another.

We think that much good would accrue if the United States government would in the sale of its public lands reserve the right to restrict and control the selling of liquor thereon. There is at least one coal company in the West which would make a nice revenue by the renting of its lands to saloon keepers and which doubtless could even erect such places as boarding houses and so profit even more directly from the profit of liquor selling.

It refrains from so doing and it is probable that thereby it would do much to make model towns if Uncle Sam did not himself make a profit which the coal company has spurned. For near the towns are tracts which may be and are bought by individuals as coal land.

The price is held too high at present to make the land attractive as a mining proposition, but it is admirable ground for the raising of saloons, pig's ears and questionable dance halls where fan-tan flourishes and the orientals aid the progress of degeneracy.

## Discussion By Readers

### Starting Longwall in Room-and-Pillar Work

*Letter No. 1*—Having noted the request for a general discussion of the question of opening a longwall face in a room-and-pillar mine, COAL AGE, Apr. 4, p. 587, and having had considerable experience in this kind of work, I offer the following:

In the mine to which I will refer, the coal was from 3 to 4 ft. thick and overlaid with a soft slate that ranged from 1 to 3 ft. in thickness. This was again overlaid with a harder slate that made a good roof. The mine had been opened on the room-and-pillar system, and 12 rooms had been turned off one heading and driven about 30 ft. when it was found necessary to abandon them, owing to the expense of maintaining a slate crew, which together with the extra cost for yardage and timbering, made it impossible to continue the work further on this plan.

The manager, knowing that I had formerly had experience in longwall work, asked me if I would undertake to open this section on that plan. I agreed to try, and first cut the 12 rooms into each other, at the face, and built up solid packwalls of slate and dirt, just back from the face. In places it was necessary to build chocks of timber filled with slate. By laying a good road in every fourth room, I was able to open out and work a longwall face from 200 to 250 ft. in length. I used good straight props and good cap pieces over each timber. Where the bottom was soft, I dug through the fireclay and set the post on a hard rock bottom.

The plan worked fine. Using a short-wall, Jeffrey machine, it was possible to make one cut the entire length of the face, to a depth of 6 ft. The result was a larger percentage of lump coal was obtained and the output greatly increased. For a 3-ft. seam, cut 6 ft. deep, counting a cubic yard of coal to the ton, the coal mined would average 2 tons for every yard of face cut. The loaders would move the slate while the motor was pulling the trip to the bottom and returning with another trip of empties.

In this system, practically no coal was lost, the entire seam being taken out clean. In some cases, it is possible to carry two or more independent longwall faces; one, say 50 ft. ahead of the other. In many cases, the only practicable scheme to adopt, to work the coal at a profit is to change from the room-and-pillar system to a longwall face such as I have described.

A. T. WADE.

Red Ash, Va.

*Letter No. 2*—Constant reader, COAL AGE, Apr. 4, p. 587, asks: "Can a common packwall system of longwall mining, with two or three sets of posts at the face,

be made to successfully replace the room-and-pillar system, in a mine that has advanced about two miles." In reply to this question, I say yes, having made such a change myself in the following manner:

In Fig. 1 the full lines show the general plan of a mine working on the room-and-pillar system, while the dotted portion shows the extension of the workings on a longwall basis or system of working. The full lines show the extent of the room-and-pillar workings at the time when it was decided to make the change and put the mine on longwall work. At that time, the room-and-pillar workings consisted of one pair of main or face entries, to the right and left of which are shown the last two pairs of cross-headings, on which rooms are still working, as shown in the plan.

Having decided to change this plan of working for a longwall system, the first step to be taken is to stop the face entries, as well as all the cross-entries. Four men must be put to work at once to open what will be called the 19th level, right," which is to be driven to the right, at the head of the face entries, as shown on the plan. This roadway or level is to be driven 12 ft. wide, with a 12-ft. pack on each side, leaving a 5-ft. space between these packs and each coal face, or rib, making the entire width of the opening 46 ft. At the same time, four men are likewise started to open what will be known as the "19th level, left," in the same manner as just described. Both of these levels must be double shifted, in order to supply a sufficient number of working places for the men who are still driving rooms in the room-and-pillar workings. As places are ready for them in the longwall work, they are transferred from the room-and-pillar workings, to the former.

In the longwall work, "gates" or roads are maintained parallel to the face headings in the room-and-pillar work.

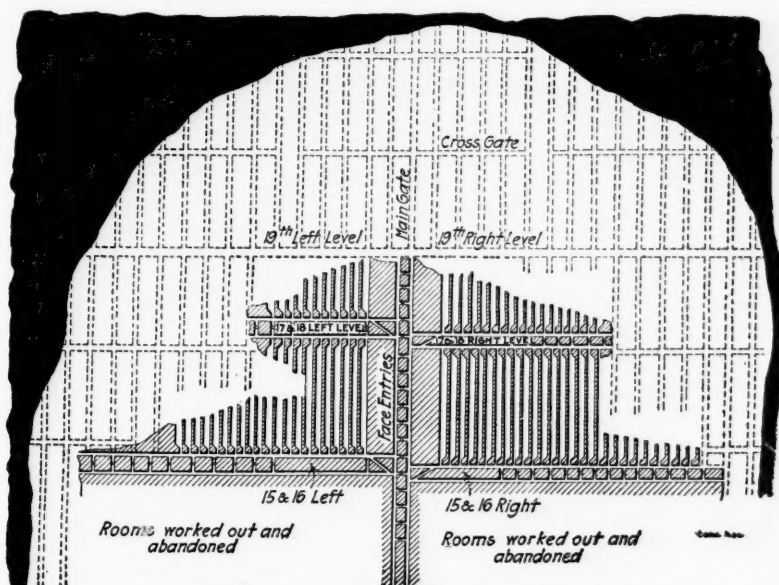


FIG. 1. STARTING LONGWALL FROM ROOM-AND-PILLAR WORKINGS



These gates should be 100 ft. apart if conditions will permit. At times, it may be found necessary to reduce this distance between gates; but it should be remembered that this will increase the expense of "ripping" and packing. The gate which is the extension of the main haulage road of the room-and-pillar workings, as well as the gates dividing the several panels, are "main gates." Each main gate takes the coal from five intervening gates on each side. This plan avoids the necessity of maintaining roads in each gate, after it is cut off by a cross-gate. The cross-gates are driven to the right and left of the main gates, at distances apart varying from 300 to 400 ft.

To provide for the proper movement of cars, it is necessary to put in a "parting" or side track on each main gate just off the level or cross-gate. As each cross-gate is finished, this siding is moved forward to the next cross-gate. The gates opened to the right of 19 right and the left of 19 left work the coal back to the room-and-pillar workings. Ordinarily, four men work in each gate, making 44 men to each main gate.

In Fig. 2, I have shown the proper method of arranging the packwalls and timbering the longwall face. The superintendent of every longwall mine should determine the proper distance apart for setting posts at the face.

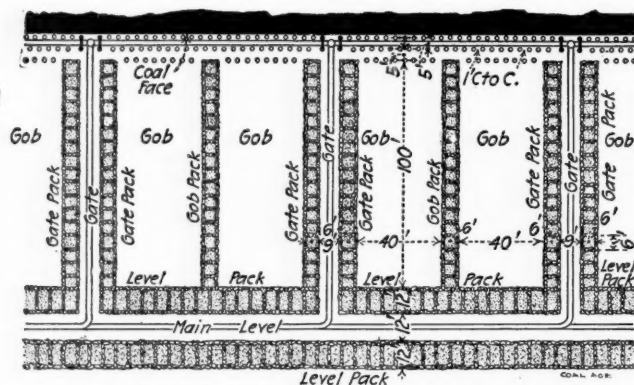


FIG. 2. LONGWALL ADVANCING, SHOWING USE OF GOB AND ROADSIDE PACKS

This is necessary because conditions differ in every mine, in this respect. On no account must posts be left in the gob or at gatesides, because they have a tendency to throw the weight on the coal face, which will frequently cause heavy roof falls that will obstruct the ventilation and cause unnecessary expense for removal.

Before finally deciding to change room-and-pillar workings, in a mine, for the longwall system, a competent longwall man should visit the mine, to study the roof conditions and give his opinion and advice. In the particular seam to which Constant Reader refers, there are 9 in. of soft slate underlying the coal and a 9-in. stratum of coal beneath that, underlaid again with soft fireclay that has a tendency to heave. This floor should be left severely alone, because if bottom is lifted, endless trouble will result from the heaving of the floor, causing extra expense to keep the roads open.

The advantages to be derived from working coal by the longwall system where it can be employed are as follows: 1. Practically 100 per cent. of the coal is extracted, which is from 10 to 15 per cent. more than in the room-and-pillar system. 2. The coal works more readily, which should reduce the price of mining, and the coal is less broken. 3. The workings are more eas-

ily ventilated, reducing the cost for bratticing and giving better air to the working face. 4. The distance of hauling the coal is generally reduced, for the same output per day, and there are fewer roads to keep open. 5. More men can be employed and a larger output obtained, for the same area of mining than in the room-and-pillar system. 6. The "weighting" of the roof reduces the labor of mining the coal when proper advantage is taken of this factor in longwall working. 7. The expense and danger of blasting are practically eliminated.

It is important in longwall work that the "ripping" should be kept well up to the face, in each gate. Also, the packwalls should be solid and well built. Loosely built packs are crowded out into the roads when the weight comes on them.

HARRY MARSON.

Piney Fork, Ohio.

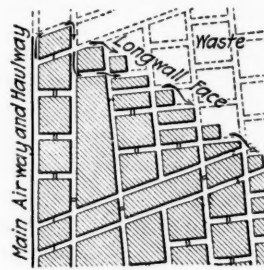
*Letter No. 3*—I was much interested in the inquiry of Consant Reader, COAL AGE, Apr. 4, p. 587, in reference to starting a longwall face, from room-and-pillar workings. I have had 16 years' experience in longwall work, in England. In my opinion, a seam of coal from 4 to 4½ ft. in thickness, with a hard top, is favorable to longwall work. This system has numerous advantages, which may be stated as follows:

The longwall system of mining permits a larger percentage of extraction of coal than can be obtained in the room-and-pillar system. The ventilating current is made to sweep the working face; and, since the waste portions of the mine are closed tight, there is very little opportunity for the accumulation of gas in abandoned places. Less timber is required, and there is practically no expense for yardage.

The most successful plan of longwall work that I have ever witnessed was where the working face presented a broken line. This was accomplished by allowing one place to lead another by about 30 ft., as illustrated in the accompanying figure, showing a small portion of the workings.

This plan had the effect of allowing each place to bear its own weight, with the result that it is almost impossible for a sudden weight to be thrown on the face that often results in a heavy cave. In general, the roadside packs should be from 9 to 12 ft. wide. As the work advances, cross-roads are started off the main road so as to cut off the gob roads leading to the face. The purpose of this is to cut down the long haul and reduce the number of roads to be kept up. The same rails can be used over and over again. All abandoned gob roads should be fenced off when the track and timbers are drawn.

In order to obtain the necessary headroom on the roads, the roof should be brushed instead of lifting bottom, particularly if the bottom is soft. The material taken from the roof over the roadways is then used for building packs at the side of the road. No timber should be left standing in the gob, as it will prevent an even subsidence of the roof on the packwalls and will often cause a sudden weight to be thrown on the face. With



SHOWING BROKEN LINE OF LONGWALL FACE

suitable care, roof caves will seldom occur where the working face is advanced uniformly. In longwall work it is important to employ men who understand the system and know how to set the props and draw the back timber as the face advances.

In regard to changing the system of mining from room-and-pillar work to longwall, it is important to prepare for the first weighting of the roof. Cribs must be built every 4 to 6 yd. apart. The gob roads can be laid out from 60 to 70 ft. apart, on each side of the main road, which should be 12 ft. wide; and good solid road-packs should be built on each side of the track. Before making the change from room-and-pillar work to longwall, it is important to lay out a good plan and determine the position of the main haulage road, cross-roads and packwalls. As previously stated, unless substantial cribs and packs are built in a careful manner, the first weighting of the roof will destroy the face. When this is once controlled, the rest is easy. The main intake current is carried up the main road to the face by erecting curtains at the mouth of each cross-road. At the face the current is split, the air passing to each side and returning along the face and the gob roads to the upcast.

JACOB RILEY,  
Section Boss.

Universal, Ind.

## The United Mine Workers and the National Guards

I was pleased to note the brief editorial, COAL AGE, Mar. 28, p. 531, commenting on the attitude assumed by the United Mine Workers of America in their convention held at Peoria, Feb. 27, at which time the convention went on record as being opposed to the National Guards as maintained in the various states.

The action of the convention, in this respect, is greatly to be deplored. Their contention that the guards are always on the side of capital and never on the side of labor is more of a reflection on themselves as representatives of a great class of workers than on the National Guards. It is the duty of the National Guards, when called upon to act in cases of labor disputes, to protect life and property that are menaced by the attitude of many of the strikers. In the performance of their duty, they frequently come into violent contact with those acting in opposition to law and order.

I do not wish to go on record as being opposed to unionism. On the contrary, I am a firm believer in the spirit of unionism—the spirit that prompts men to band together for mutual benefit and protection. But, when a union adopts a reactionary policy, in opposition to law

(Concluded on next page)

# Study Course in Coal Mining

By J. T. BEARD

## The Coal Age Pocket Book

**Summation of Potentials**—When an air-current passes in succession through two or more airways of different section, the total unit pressure (lb. per sq.ft.) due to the circulation is equal to the sum of the unit pressures of the several sections. The arrangement, in this case, may be described as "tandem."

Likewise, in a tandem circulation, the total power on the air (ft.-lb. per min.) producing the circulation is equal to the sum of the powers absorbed in the several sections through which the current passes.

Indicating the potentials of the respective sections of the air course in a tandem circulation by  $X_1, X_2, X_3$ , etc.; and the corresponding unit pressures and powers on the air by  $p_1, p_2, p_3$ , etc.; and  $u_1, u_2, u_3$ , etc., respectively, remembering that the square of the pressure potential is equal to the cube of the power potential, as expressed by the formula

$$X^2 p = X^3 u$$

we can write the following:

For tandem circulations, calling the general mine pressure  $p_0$  and the total power on the air  $u_0$ ,

$$\text{Mine pressure, } p_0 = Q^2 \left( \frac{1}{X_1^2 p_1} + \frac{1}{X_2^2 p_2} + \text{etc.} \right)$$

$$\text{or } p_0 = Q^2 \left( \frac{1}{X_1^3 u_1} + \frac{1}{X_2^3 u_2} + \text{etc.} \right)$$

These formulas may be written more simply by indicating the summation of the potential factors by the character  $\Sigma$ ; thus,

$$\text{Mine pressure, } p_0 = Q^2 \Sigma \left( \frac{1}{X^2 p} \right)$$

$$\text{or } p_0 = Q^2 \Sigma \left( \frac{1}{X^3 u} \right)$$

In like manner, the total power on the air or power producing tandem circulation in a mine is expressed by the formula,

$$\text{Power on the air, } u_0 = Q^3 \left( \frac{1}{X_1^3 u_1} + \frac{1}{X_2^3 u_2} + \text{etc.} \right)$$

$$\text{or } u_0 = Q^3 \left( \frac{1}{X_1^2 p_1} + \frac{1}{X_2^2 p_2} + \text{etc.} \right)$$

These formulas may be expressed by indicating the summation of the potential factors, as before; thus,

$$\text{Power on the air } u_0 = Q^3 \Sigma \left( \frac{1}{X^3 u} \right)$$

$$\text{or } u_0 = Q^3 \Sigma \left( \frac{1}{X^2 p} \right)$$

If desired, the part potential value can be used by omitting  $k$  when finding its value, and writing the  $k$  outside the parenthesis; but the relative potential obtained by canceling common factors cannot be used here. The relative potential, so much used in the calculation of the splitting of air currents, can only be employed when the potential appears as a ratio.

## The Coal Age Pocket Book

**Example**—A shaft mine has been opened on the triple-entry system. The downcast and upcast shafts are each 600 ft. deep and 8x20 ft. in section. The main headings have been driven a distance of 2000 ft. from the shaft bottom. The center one of these headings is the intake and is 7x14 ft. in section, while the two side headings are the return airways for the respective sides of the mine and are each 6x12 ft. in section. On each side of the main headings cross-headings, 6x10 ft. in section, have been driven 500 ft.

If the intake air divides at the face of the main heading and equal currents ventilate the two sides of the mine, what power on the air will be required to circulate a total of 60,000 cu.ft. per min. in this mine, and what water gage will be produced in the fan drift?

**Solution**—The first step is to calculate the potential values of the two shafts, main intake, two cross-headings and two return airways, as follows, remembering that these being equal splits, it is only necessary to double the potentials of the cross-headings and return airways by taking twice the sectional area:

Shafts,	8 × 20 ft., 600 ft.;	$a = 160$ sq.ft.;	$s = 67,200$ sq.ft.
Main intake,	7 × 14 ft., 2000 ft.;	$a = 98$ sq.ft.;	$s = 84,000$ sq.ft.
Two cross-headings,	6 × 10 ft., 500 ft.;	$2a = 120$ sq.ft.;	$s = 32,000$ sq.ft.
Two return airways,	6 × 12 ft., 2000 ft.;	$2a = 144$ sq.ft.;	$s = 144,000$ sq.ft.

The part potential values are then as follows, omitting  $k$ :

$$\text{Shafts, } \frac{1}{X^2 u} = \frac{s}{a^3} = \frac{67,200}{160^3} = 0.0164$$

$$\text{Main intake, } \frac{1}{X^2 u} = \frac{s}{a^3} = \frac{84,000}{98^3} = 0.0892$$

$$\text{Two cross-headings, } \frac{1}{X^2 u} = \frac{s}{(2a)^3} = \frac{32,000}{120^3} = 0.0185$$

$$\text{Two return airways, } \frac{1}{X^2 u} = \frac{s}{(2a)^3} = \frac{144,000}{144^3} = 0.0482$$

$$\text{Sum of potential values, } \Sigma \left( \frac{1}{X^2 u} \right) \dots\dots\dots 0.1723$$

The horsepower on the air in the fan drift, in this case, is found by substituting this general potential value, in the formula for finding the power in a tandem circulation; thus,

$$H = \frac{k Q^3}{33,000} \Sigma \left( \frac{1}{X^2 u} \right) = \frac{0.00000002 \times 60,000^3 \times 0.1723}{33,000} = 22.55 \text{ hp.}$$

The water gage, in the fan drift, due to this circulation, can be calculated in like manner, independently, from the same general potential value, by substituting the same in the formula for finding the unit pressure and water gage in a tandem circulation; thus,

$$w.g. = \frac{k Q^2}{5.2} \Sigma \left( \frac{1}{X^2 u} \right) = \frac{0.00000002 \times 60,000^2 \times 0.1723}{5.2} = 2.38 \text{ in.}$$

The same result is obtained when the water gage is calculated from the power and the quantity of air in circulation.

and order, or any body of men permit themselves to be controlled by unscrupulous leaders, I am opposed to such leadership as dangerous.

It is folly to say that the union is always right, or to claim that coal operators are always right. I am opposed to the practice of operators bringing strike breakers to a field of contention, except when every honorable effort has been made and failed to induce the men to return to work. The importation of such workers, however, furnishes no excuse for the wanton destruction of property or the taking of lives that often results on such occasions. When the miner's sense of what is just and fair will not restrain him from lawless acts, he must be prevented by other means, and the National Guards is the institution created for that purpose.

It is generally the case that the governor is censured more frequently and more severely for not calling out the guards than for using this means of maintaining or restoring order. In my opinion, the only valid reason for discarding the services of the National Guards will be because they are no longer required. We may hope for the day to come when this will be true; but, for the present, we must recognize the fact that the National Guards is an indispensable factor of state government.

GEO. N. LANTZ.

New Straitsville, Ohio.

## Removing Bark from Mine Timbers

The correspondent who suggested, some time ago, that bark should be left on mine timber is, I believe, in error. The bark certainly aids in the propagation of organisms that weaken the timber. Innumerable tests have demonstrated the truth of this fact.

In one instance, two pieces of fir were kept five months, one with the bark on and the other with the bark off. The compression tests, later, showed the former piece to have a breaking strain of 3,570 lb. per sq.in., the latter 3,385 lb.; for pine, the tests showed 2,716 lb. with bark on and 2,958 lb. with bark off; for oak, 2,133 lb. and 2,958 lb., respectively.

MINING ENGINEER.

Pittsburgh, Penn.

## Correction

In the Study Course in Coal Mining, Apr. 11, p. 623, an error occurred in the calculation of the relative split potentials, for finding the natural division of the air current. As this error affected the remainder of the solution, we reprint those two pages corrected, below. The natural division of air given, p. 659, should also be corrected to correspond.

# Study Course in Coal Mining

BY J. T. BEARD

## The Coal Age Pocket Book

The use of the "relative potential" value, in all calculations to determine the natural division of air between two or more airways, is one of the most important considerations in the saving of time and labor and avoiding unnecessary multiplicity of figures, which increases the opportunities for error and yields less accurate results. An example or two will serve to make this fact plain.

### EXAMPLES IN NATURAL DIVISION

**Example**—An air current of 100,000 cu.ft. per min. is divided at the foot of the downcast shaft, between the following four air courses or splits, thereby providing two separate ventilation districts on each side of the shaft:

Split A,	8 × 12 ft., 6000 ft. long
Split B,	6 × 20 ft., 12,000 ft. long
Split C,	6 × 12 ft., 8000 ft. long
Split D,	4 × 6 ft., 1000 ft. long

All the splits are open to the free passage of the air, no regulators being used. (a) Find the natural division of the main air current or the quantity of air passing in each split. (b) What is the pressure due to this circulation? (c) What is the horsepower on the air?

**Solution**—(a) The first step is to calculate the relative pressure potential for each of the four air splits. The area, perimeter and length of each airway are as follows:

Split A,	a = 96 sq.ft.;	o = 40 ft.;	l = 6,000
Split B,	a = 120 sq.ft.;	o = 52 ft.;	l = 12,000
Split C,	a = 72 sq.ft.;	o = 36 ft.;	l = 8,000
Split D,	a = 24 sq.ft.;	o = 20 ft.;	l = 1,000

Instead of using these full values as when finding the true potential value of an airway, the lowest relative values for the areas, perimeters and lengths are used. These relative values are obtained by canceling the common factors in the areas, perimeters and lengths, separately, which gives

Split A,	a = 4;	o = 10;	l = 6
Split B,	a = 5;	o = 13;	l = 12
Split C,	a = 3;	o = 9;	l = 8
Split D,	a = 1;	o = 5;	l = 1

The relative split potentials are then found as follows:

$$\text{Split A, } 4\sqrt{\frac{4}{6 \times 10}} = 4\sqrt{\frac{1}{15}} = 4\sqrt{0.06666} = 1.033$$

$$\text{Split B, } 5\sqrt{\frac{5}{12 \times 13}} = 5\sqrt{\frac{5}{156}} = 5\sqrt{0.03205} = 0.895$$

$$\text{Split C, } 3\sqrt{\frac{3}{8 \times 9}} = 3\sqrt{\frac{1}{24}} = 3\sqrt{0.04166} = 0.612$$

$$\text{Split D, } 1\sqrt{\frac{1}{1 \times 5}} = \sqrt{\frac{1}{5}} = \sqrt{0.2} = 0.447$$

$$\text{Sum of relative potentials.} \dots\dots\dots 2.987$$

## The Coal Age Pocket Book

Since the quantity of air passing in each split, in natural division is proportional to the corresponding potential, the quantity ratio is equal to the potential ratio, which is true also for the sum of the quantities and the sum of the potentials. Thus, the ratio of the quantity (q) passing in any split, to the total quantity (Q) in circulation, is equal to the ratio of the corresponding split pressure potential (X<sub>p</sub>), to the sum of all the split potentials (Σ X<sub>p</sub>).

$$\frac{q}{Q} = \frac{X_p}{\sum X_p}; \text{ which gives } q = \frac{X_p}{\sum X_p} Q$$

Therefore, substituting the relative potential values just found in this formula gives the following:

$$\text{Split A, } q_a = \frac{1.033}{2.987} \times 100,000 = 34,570 \text{ cu.ft. per min.}$$

$$\text{Split B, } q_b = \frac{0.895}{2.987} \times 100,000 = 29,960 \text{ cu.ft. per min.}$$

$$\text{Split C, } q_c = \frac{0.612}{2.987} \times 100,000 = 20,500 \text{ cu.ft. per min.}$$

$$\text{Split D, } q_d = \frac{0.447}{2.987} \times 100,000 = 14,970 \text{ cu.ft. per min.}$$

Total quantity..... 100,000 cu.ft. per min.

(b) Since the pressure is the same for all the splits, it can be calculated from any one of the given splits, by substituting the values for that split in the formula

$$p = \frac{k l o q^2}{a^3}$$

Thus, taking split A,

$$p = \frac{0.00000002 \times 6000 \times 40 \times 34,570^2}{96 \times 96 \times 96} = 6.48 \text{ lb. per sq.ft.}$$

(c) The horsepower on the air in the main entry, or the horsepower producing this circulation is, then,

$$H = \frac{Q p}{33,000} = \frac{100,000 \times 6.48}{33,000} = 19.6 \text{ hp.}$$

**General Mine Potential**—The potential value for the combined splits can be calculated from the total quantity of air in circulation and the resulting pressure, using the formula

$$X^2_u = \frac{Q^2}{p}; \text{ or } X_u = \sqrt{\frac{Q^2}{p}}$$

**Example**—What is the general power potential for all the splits combined, in the example given above, where 100,000 cu.ft. of air was circulated under a pressure of 6.48 lb. per sq.ft.?

**Solution**—The general power potential for these combined splits is

$$\text{Mine power potential, } X_u = \sqrt{\frac{Q^2}{p}} = \sqrt{\frac{100,000^2}{6.48}} = 1155$$



## Inquiries of General Interest

### Room-and-Pillar System vs. Longwall

How does the room-and-pillar system differ from the longwall method of mining coal, in usage, cost and the methods employed for the extraction of the coal?

R. E. WOODEN.

Cambridge, Mass.

In reply to this question, we would refer correspondent to the interesting discussion started in COAL AGE, Jan. 10, p. 99. Much valuable information is contained in the letters, pp. 339, 419 and 458, following. The comparative advantages of these two methods of mining coal are enumerated in the letters discussing the question of starting longwall in room-and-pillar work, in this issue, pp. 697-9.

The longwall method of mining is used in preference to the room-and-pillar system, in the working of thin seams of coal, especially under excessive roof pressure, or where the complete extraction of the coal is important.

The cost of mining coal by the longwall method is generally less than that in the room-and-pillar system, owing to the more complete extraction of the coal, which is less broken and a less percentage of which is lost as fine coal and slack, in mining; less timber is used, the distance of haul is less and fewer roads are to be maintained; little or no powder is used for blasting the coal; the ventilation is better and more easily accomplished; a larger daily output is obtained for the same number of working places and men employed; there is less expense for handling waste, which in the longwall method is used for building packwalls, but in the room-and-pillar system must generally be taken out of the mine; there is less interruption of work and fewer accidents due to roof falls; mine fires are less frequent; and, finally, there is less damage to surface property, resulting from the extraction of the coal.

In the longwall method of mining, the coal is undermined by handpick or machine; and, by a careful and judicious system of timbering, the roof pressure is so controlled that it is utilized to break down the coal shortly after the sprags are drawn. In this method, little or no powder is used to break the coal. In the room-and-pillar system, the coal is undermined and sometimes side cut or sheared and then blasted down by drilling a hole in the coal face and firing a charge of powder sufficient to break the coal. In some cases, the coal after being undercut is wedged down by means of iron wedges driven close to the roof above the coal.

### Laying Out Mine-Track Curves

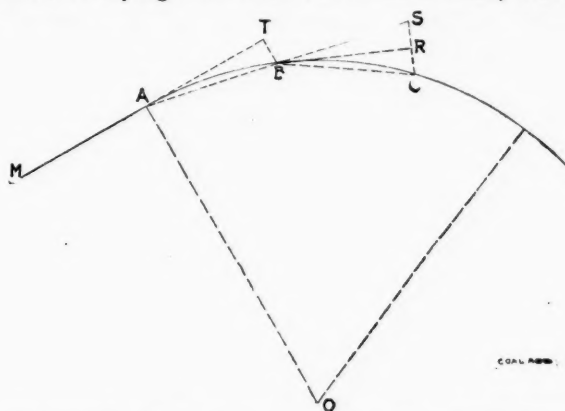
Kindly ask, through COAL AGE, or give me some information in regard to mine-track curves. In our mines we lay out all curves on a 63-ft. radius. The engineers give the point of curve, and the mine foreman measures 6 ft. ahead and offsets 7 in., in laying out the curve. Can

you give me the formula for finding the chord and offset, in curves of different radius?

ADIGO.

Burdine, Ky.

Referring to the accompanying figure, a common method of laying out track curves in a mine, starting



A PRACTICAL METHOD OF LAYING OUT TRACK CURVES IN MINES

from the point of curve A on the straight track MA, is to extend the tangent MA to a point T, making AT any convenient or desired length, depending on the sharpness of the curve. In the case mentioned by correspondent, the chords AB and BC are each 6 ft. in length, and BS is equal to BC. The offset TB is called a "tangent deflection;" while SC is a "chord deflection." By the principles of geometry, the chord deflection SC is twice the tangent deflection TB; and a line drawn from B to R, the middle point of SC, is tangent to the curve at B.

The following formulas are used to calculate the chord deflection SC or the tangent deflection TB:

$$TB = \frac{c^2}{2r} = \frac{6^2}{2 \times 63} \times 12 = \text{say } 3\frac{1}{2} \text{ in.}$$

$$SC = \frac{c^2}{r} = \frac{6^2}{63} \times 12 = \text{say } 7 \text{ in.}$$

In practice, it is convenient to use a short stick cut to the length of the chord deflection SC, and attached to two wires BS and BC, each the length of the given chord. By this means, the curve is quickly laid out, from point to point. The ends of the two wires BS and BC are attached to a small ring at B, through which a surveyor's stick pin can be passed.

To lay out a curve with this device, the stick pin is passed through the ring and first stuck firmly in the ground at the point of curve A. The center of the stick R when the wires are drawn taut is then lined in with the tangent MAT, and the end of the stick (C) then marks the first point B in the curve. The pin is now moved to B and the operation repeated, except that, now, the end of the stick (S) is made to line with the chord AB, when the other end C will mark the second point in the curve.

## Examination Questions

### Miscellaneous Questions

(Answered by Request)

*Ques.*—(a) Define the different electrical units and say to what they refer. (b) An electrical machine works at 150 volts and 25 amp.; what is the horsepower of the machine?

*Ans.*—(a) The four simple electrical units are the following:

1. The *ampere*, which measures the volume, commonly termed the strength of the current.
2. The *volt*, which measures the pressure or intensity of the current. In speaking of electricity, the voltage of a current is commonly referred to as the electromotive force.
3. The *ohm* or unit of resistance, which serves to measure the amount of resistance offered by a conductor to the flow of the electric current.
4. The *watt* or unit of power, which serves to measure the power of the electric current. One horsepower is equivalent to 746 watts.

(b) The horsepower in this case is

$$H = \frac{150 \times 25}{746} = 5 + hp.$$

*Ques.*—Where and when would you enter and make out your daily report, after completing the examination of the mine, in the bituminous region of Pennsylvania?

*Ans.*—The Bituminous Mine Law of Pennsylvania (Art. 5, Sec. 2) requires that a suitable record book shall be kept at the mine office on the surface; and that the fireboss, immediately after completing the examination of the mine, or any portion thereof, shall enter in said book, with ink, a record of such examination and sign the same. This record must show the time taken in making the examination and also clearly state the nature and location of any danger discovered in any room, entry or other place, in the mine.

The same section of the law provides, also, that such a record book may be kept at a station located in the intake entry of the mine; but, in this case, the fireboss is required to sign also the report entered in the record book in the mine office on the surface.

Art. 8, Sec. 3, of the same law requires a like daily record to be made in a similar book kept at the mine office, by the person whose duty it is to examine the ropes, links and chains in the hoisting shaft at least once in 24 hours.

*Ques.*—If, in the examination of a mine, the air current was found charged with gas to the explosive limit when the air was not completely saturated, what would be the explosive condition of the same air current after complete saturation had taken place?

*Ans.*—The effect of an increase in the degree of humidity of the mine air on its explosive condition is somewhat questionable. While it cannot be denied that, in the event of ignition taking place, the evaporation of a larger amount of water, per unit of volume of gas-charged air, will result in the absorption of a corres-

ponding amount of heat and will, to that extent, modify the violence of the explosion by decreasing the temperature developed in the ignition, this effect is generally conceded to be practically inappreciable. The chief point in question, however, is whether the saturated condition of the air would have any practical effect to raise or lower the point of ignition of the explosive mixture.

The purpose of saturating the intake current of a mine, which is generally conceded to be good practice, is *not* to decrease the explosibility of the air; but to carry the moisture thus absorbed by the air current into the mine, and thereby prevent the absorption of moisture from the mine workings by a dry air current. In answer to the question asked, we think it may be safely stated that the increase of saturation in the mine air will not appreciably affect its explosive condition.

*Ques.*—A tract of coal land contains 1500 acres; the coal lies 500 ft. below the surface; the seam is 4 ft. thick and underlaid with 3 ft. of fireclay, beneath which is 4 ft. of sandstone. Above the coal is 5 ft. of slate and the measures overlying the slate are sandstone and shale. The coal is known to give off gas. How would you proceed to open and develop this property, to produce 1200 tons of coal per day of 8 hours?

*Ans.*—To provide for a daily output of 1200 tons of coal, it is necessary to estimate on, say 400 miners, 200 loaders, 15 drivers and the same number of mules, 25 bosses, daymen and boys, making a total of, say 640 men underground. The mine being gaseous, provision must be made for not less than 200 cu.ft. per man, and from 500 to 600 cu.ft. per min. per mule. The total volume of air required to fulfill these requirements should not be less than, say 150,000 cu.ft. per min.

A three-compartment shaft should be sunk to the coal, providing two hoistways, say not less than 6x9 ft. in the clear, each, and one manway of the same dimensions making the size of the shaft, say 9x20 ft. in the clear. This hoisting shaft should be made the downcast for the mine. The mine should be opened, preferably, on the four-entry system, providing two intake haulage roads, one for empties running into the mine and the other for coal coming out, and flanked by two return airways, one for each side of the mine. This main-entry system should be driven on both sides of the shaft, thereby providing four separate sections of the mine, each having a separate ventilating current and each producing on an average 300 tons of coal per day. The main-haulage roads should be driven 6x10 ft. in section, while the return airways may be driven 5x12, or, preferably, 5x14 ft. in section, to avoid the handling of an unnecessary amount of slate taken from the roof. The bottom should not be disturbed.

If conditions will permit, better results will be obtained by working this seam longwall. If surface conditions are favorable, the shaft should be located centrally in the property, so as to reach as large an area of coal as practicable. Conditions, however, must determine both the number and location of shafts required.

## Coal and Coke News

### Washington D. C.

It has been understood that the investigations of the Interstate Commerce Commission into the doings of the anthracite coal roads would be resumed on Apr. 22 and that at that time the roads would be allowed to continue their presentation of the case to its completion, setting forth all of their rates and practices.

The inquiry as now planned is to be the most extensive the commission has ever undertaken. The immediate defendants number nine: Reading, Jersey Central, Lehigh Valley, Delaware & Hudson, Lackawanna, Erie, with the New York, Susquehanna & Western, and Pennsylvania with the Northern Central. As a matter of fact, all roads east of the Mississippi are named as nominal defendants to the investigation, although the case naturally centers around those above named.

The investigation was started by the commission of its own volition, and most elaborate statistics have been asked of the nine defendant roads.

There have been several cases before the commission against hard-coal rates, but all in which a finding was made affected only individual roads.

Thus, the so called Marian Coal Co. case filed in 1910 which resulted in reductions of rates from the Wyoming district to Hoboken affected the Lackawanna. The celebrated Meeker complaint involved rates on the Lehigh Valley to Perth Amboy and in that case rates on sizes larger than buckwheat were marked down. Going further back, the suit of Coxe Bros. vs. Lehigh Valley in 1888 and Haddock vs. the Lackawanna in 1890, affected only special rates and the reductions were never put in force.

The so called Hearst case of 1902 was broad in its scope, but as the evidence advanced it was almost entirely rates to tidewater that were discussed, and no finding was ever made. This case was up before the commission in 1905, reopened by the commission in 1906, reargued again that year and then lapsed for almost 8 years, and was finally dismissed only last February, this action undoubtedly being taken in view of the present investigation.

#### Progress in the Freight Rate Case

Further progress with the freight rate case before the Interstate Commerce Commission has confirmed the belief that the commission does not intend to consider the granting of higher rates to the coal carrying roads if that can in any way be avoided. The turning of the discussion to the financial condition of the roads as has now been ordered by the commission is considered to be an exceedingly favorable symptom by those who have been opposed to the advancing of coal rates. In their judgment the roads chiefly concerned in the carrying of coal are in so favorable a financial situation that they will not be able to make out any sufficient case for higher rates from the standpoint of necessity except insofar as they demand these rates in order that they may be able to equalize their charges with those of the other railways which have been calling for an advance.

It had not been expected that the commission would go into the financial aspect of the roads in connection with this investigation of the proposed advance rates demanded, indeed it had been some time ago expressly stated that the commission thought it unnecessary or undesirable to undertake that phase of study. Just what has changed the point of view in this way is not altogether clear, but it is supposed that the principal factor has been the constant effort of the railroads to show that the advance in the rates is necessary to them from the mere standpoint of keeping their heads above water.

In the judgment of members of the commission, it is understood, the discussion of finance will show that in the case of some roads which are primarily devoted to the carrying of specified classes of commodities, the demand for an increase on this ground is misleading. The coal roads for instance, or those which are largely engaged in the transportation of coal in all parts of the country are believed to be conspicuously in this position.

#### HARRISBURG, PENN.

Denial of the existence of collusion between the Lehigh & Wilkes-Barre Coal Co. and the Central R.R. of New Jersey,

in regard to the settlement of accounts or other financial business, was made on Apr. 14 by officials of the coal company at the resumption of hearings in the anti-trust suit of the Federal Government against the Reading and other groups of anthracite companies.

W. C. Johnson, comptroller of the coal company, testified that coal is sold to the Central R.R. of New Jersey at the same prices as are charged to other consumers. The coal company and the Central R.R., which controls it through majority stock ownership, keep entirely separate accounts.

Testimony along similar lines was given by C. F. Huber, vice-president and general manager of the Lehigh & Wilkes-Barre Coal Co. He also asserted that the statistics known as the "Griffith" tables prepared about 18 years ago, and purporting to show the extent of the unmined coal in Pennsylvania are erroneous.

S. D. Warriner, president of the Lehigh Coal & Navigation Co., testified that this company is entirely independent of connection or association with railroad business.

Further testimony, intended to show that separate organizations and managements are maintained for the coal mining and coal transporting companies was given on Apr. 17, when hearings for the defense were resumed.

W. G. Brown, secretary of the Philadelphia & Reading Coal & Iron Co., said that his company paid the Philadelphia & Reading Ry. the regular tariffs for transporting coal. On cross-examination for the Government, he admitted that George F. Baer is president of both companies and is an active director of the coal and iron company. He conceded that on monthly balances the coal and iron company was always debtor to the railway, although only the customary 60 days' credit was extended.

W. J. Richards, vice-president and general manager of the coal and iron company, testified as to the great technical difficulties experienced in coal mining in the Schuylkill region. Although the Government objected to his testimony as irrelevant and immaterial, it was embodied in the records.

Mr. Richards said his company had spent \$12,374,000 in improvements during the last 12 years, but no new lands were acquired. He gave the cost of production of anthracite coal, in the fiscal year ending June 30, 1913, as \$2.35 per ton, although in a statement rendered to the Interstate Commerce Commission the company had given the cost in November, 1912, as \$2.282. Mr. Richards explained that the difference was due to the larger amount of coal mined in the fall of 1912, a period of record-breaking production, which lessened the cost per ton somewhat, owing to the fact that certain charges are constant whether much or little coal is produced.

#### A Lengthy Litigation

A suit started 25 years ago by the Reading Ry., to stop the mining of coal underneath Mahanoy Plane, was decided on Apr. 13. So long drawn out was the litigation that several of the masters appointed to take the testimony died before they could make a report.

Ex-Congressman James B. Reilly, who was appointed as the fourth master, made a report on the above date, which sustains the Reading Co. in obtaining the injunction, which compelled independent operators to allow pillars to remain to support the surface of the earth. But on certain tracts where more pillars were demanded than necessary the independents were awarded \$36,696 damages and the costs were also placed on the railroad company.

A large proportion of the anthracite coal sent to market by the Reading Ry. Co. is hoisted over Broad Mountain by means of gigantic stationary engines at Mahanoy Plane and it was important to the railroad to prevent any disturbance to the Plane by mining underneath.

#### PENNSYLVANIA

##### Anthracite

Larksville—Orders from Delaware & Hudson officials on Apr. 16 closed three collieries. These are Nos. 4 and 5 and the Boston, giving employment to 1500 men and boys. The officials claim that each of the collieries is in need of repairs and that because of the slight demand for coal these can best be made at this time. It is expected that the collieries will be idle for many weeks.



**Freeland**—Electricity is displacing steam at the Harwood colliery. The steam hoisting apparatus has been discarded and electric hoists substituted. The boiler house will be abandoned, as there is no further use for it. The only engine operating under steam pressure is a big first-motion hoisting engine which will be displaced in time.

**Leviston**—The few remaining miners that reside at Leviston have been asked to vacate on account of the stripping of the Lehigh Valley Coal Co., which is in close proximity to the town. The ground that is now occupied by the houses is desired for a dumping ground for the clay and rock that are being removed from the coal beds.

**Scotch Valley**—Coal-mining operations have taken on a new lease of life at the mines of the Beaver Valley Coal Co., where two steam shovels are now in operation opening a large stripping.

**Pottsville**—A corporation was made the defendant in a criminal suit for the first time in many years when a case was returned to court Apr. 16 by Justice McShea against the Lehigh & Wilkes-Barre Coal Co. The information sets forth that the defendant corporation operates a coal mine near McAdoo and has failed to keep a record of the number of cars of coal mined and loaded as required by law.

#### Bituminous

**Carrolltown**—The No. 1 mine of the Ebensburg Coal Co. at Colver, made a record in production for the month of March when 89,000 tons of coal were shipped. All this came from a single opening, and a 3½-ft. coal bed. It is believed that this record has seldom been surpassed under like conditions.

**Pittsburgh**—It is reported that Connellsville coke makers have shut down many ovens, the H. C. Frick Coke Co. interests alone having closed 1300 ovens recently.

**Indiana**—An attempt to destroy a hall being erected for the use of the United Mine Workers at Iselin was recently made. Returning to work after the lunch hour, John Ties, foreman of construction crew, found 26 sticks of dynamite beneath the building. A burning fuse had almost reached the explosives. This was, however, successfully extinguished by the foreman.

**Canonsburg**—Stringent orders have been issued by the Pittsburgh Coal Co. that hereafter its mine foremen, assistant foremen, firebosses, machine foremen, and drivers must sever their connections with all clubs which have sideboard attachments. This order has been sent to all the company's mines in Washington County.

**Sharon**—After ten years of successful operation, the coal mine on the Fogel farm near New Wilmington was abandoned Apr. 18. This is the last of about 50 of the smaller mines that have been operated during the past half century between Bethel and Sharpsville.

**Rockwood**—It is reported here that a Pittsburgh coal syndicate has notified farmers and optioners of the 10,000-acre tract in Milford Township to prepare deeds for the mineral underlying their farms. It is said that the Western Maryland R.R. will cross the river into this new coal field.

#### WEST VIRGINIA

**Fairmont**—Fire and an accident effectually put two mines of the Austin Coal & Coke Co., at Austin, out of commission recently. The fire destroyed the tippie of No. 1 mine with a heavy loss, which was partly covered by insurance. A large crowd gathered and someone entered the No. 2 mine, and released an electric motor at the head of a steep slope. This machine ran down the incline and wrecked at the bottom, effectually shutting down Mine No. 2.

**Charleston**—Declaring that they would rather shut down their mines than operate them at a loss, the coal operators of the Kanawha field on Apr. 17 refused the demand of the United Mine Workers for an advance of 10 per cent. and asked the men to accept a cut. Among other things the operators seek a reduction of four cents per ton run of mine in the Big Vein territory.

**Bluefield**—Despite the reported depression in other coal fields, the Norfolk & Western region appears to be more than holding its own as is shown by the official report of traffic over that road during the month of March. This showed an increase of 560,140 tons over the shipments for the preceding month, and 460,960 tons over the shipments from the same sources for the corresponding month of last year. The figures for the total shipments are in March, 1913, 1,751,153 tons; March, 1914, 2,112,118 tons. Coke shipments reached a total of 71,620 tons, all coming from the Pocahontas field.

#### KENTUCKY

**Harlan**—Coal operators in Harlan County are directly interested in the newly organized Harlan County Forest Protective Association, which represents in its membership the owners of over 150,000 acres of timbered land. Conservation of the lumber through prevention of forest fires is one of the objects of the association, and the coal men are co-operating in the campaign. The timber of Harlan County is of immense value in connection with the coal industry, since it is estimated that one acre of timber will mine about three-quarters of an acre of coal.

**Whitesburg**—Preliminary work in preparation for extensive coal-mining operations at Penny, just over the Letcher County line, in Pike County, have been begun under the direction of former manager John G. Smyth, of the Consolidated Coal Co. Six hundred houses will be erected and several good business blocks for the accommodation of the several thousand men who are to be given employment.

**Jenkins**—Coal-mine owners and miners in this section of Kentucky are hopeful for favorable consideration by Congress of Representative John W. Langley's bill providing for the appropriation of \$50,000 to establish here a mine-rescue station and an expert station for analyzing and testing coals, lignite and other minerals and substances.

**Lexington**—Professor H. D. Easton, of the College of Mines and Metallurgy, Lexington, Kentucky, has issued a call to all the men who have attended the Practical Miners' Course to meet on May 8 for their first reunion.

This eight weeks course was first held during the summer of 1908 and has been held each summer until the present year when it was opened on Apr. 1 with an enrollment of 30 practical miners representing all the important mining counties in the state. Kentucky State University was probably the first college to offer instruction of the nature needed by men preparing for mine foreman examinations, but other colleges have now taken up the same line and are offering similar courses.

The date of the reunion has been set so that the men can attend the annual meeting of the Kentucky Mining Institute and the state-wide First Aid Contest to be held in Lexington on May 8 and 9. As a special feature, the U. S. Bureau of Mines will have its explosion gallery on the contest field and give demonstrations with it.

#### OHIO

**Athens**—The Luhrig Coal Co., which has been operating a mine on the E. & O. S. W. west of Athens, has started to dismantle the tippie and plant to move into West Virginia.

**Cleveland**—The Rail and River Coal Co. brought suit Apr. 16 in the Federal Court to test the constitutionality of the Green anti-screen law passed by the last Legislature, which provides that the miners shall be paid for all the coal they dig. The operators closed their mines on Apr. 1 stating that the enforcement of the Green law destroyed their ability to compete with Pennsylvania and Indiana operators. A favorable decision will probably hurry a cessation of the present shut-down of all Ohio mines.

#### ILLINOIS

**Marion**—The Donnelly-Koennecke Coal Co., operating for many years north of Cartersville, in Williamson County, has been declared bankrupt, and W. O. Potter, of this place, has been appointed receiver.

**Roylton**—A slope, 50 ft. deep, has been driven from the north workings of the South Mine of the Franklin Coal & Coke Co. here, to the lower vein. Several months ago, in working northward through the mine, the coal disappeared. Borings indicated the vein 50 ft. farther down, and this condition existed for two or three miles across the tract. No more coal will be worked from the upper vein. The coal of the lower vein is of superior quality.

**Harrisburg**—Several collieries of the O'Gara Coal Co. have closed down for repairs, the time of suspension being indefinite. This will, however, probably last about three months. The mines affected are Nos. 3, 4, 9, 14 and 15. Some of this company's mines in Indiana are also closed down, and two carloads of mules have been shipped therefrom to Illinois where they have been placed in pasture.

**Peoria**—The coal operators on Apr. 16 flatly refused to accede to the demand of Illinois mine workers for higher wages. The operators have to date rejected practically every demand made upon them.

#### ARKANSAS

**Fort Smith**—Sixteen thousand union miners in District No. 21, embracing Arkansas, Oklahoma and Texas, are reported to have voted to accept a renewal of the present wage scale for the next two years at a vote taken on the proposi-

tion on Apr. 14 at Fort Smith, Ark. The alternative was to strike after July 31, when the present agreement expires.

The Bache-Benman Syndicate intends resuming operations under the open-shop policy at Prairie Creek Mine No. 4, Prairie Creek, at an early date. This was indicated recently when it became known that the plant which had been closed for more than a week as the result of a riot had been placed under guard again.

#### COLORADO

**Ludlow**—Thirteen men were killed and about 40 wounded on Apr. 20, as the result of a 14-hr. battle waged between militiamen and striking miners. During the fighting the big tent colony was destroyed by fire and hundreds of women and children are being cared for by citizens. It is reported that the militiamen lost three privates, one killed and two wounded, while the remaining casualties were sustained by the strikers. It is reported that "General" Louis Tikas, a strike leader is among the dead.

### FOREIGN NEWS

**Leeds, England**—A settlement of the Yorkshire coal miners strike was reached Apr. 15, when the men voted to resume work. The strikers numbering about 170,000 quit on Apr. 2, demanding the introduction of a minimum wage scale. A conciliation board was appointed to discuss the points at issue, and succeeded in obtaining the men's consent to the taking of a ballot.

### PERSONALS

Col. W. R. Lynn, formerly with the Caldwell Coal Co., of Huhlenberg County, Ky., has become general salesman for the Coal Coal Co. and will represent that company in Southern territory.

R. W. Overall has been made general manager of the Reinecke Coal Co. in this city, succeeding the late Fred C. Reinecke. Mr. Overall, who is also assistant secretary, has been connected with the Reinecke company for 26 years.

R. D. Norris was recently elected president of the Anthracite Division of American Institute of Mining Engineers. Four vice-presidents were also elected, W. J. Richards, Edwin Ludlow, Arthur Storr, and B. F. Huber. At the same meeting Charles Enzain was elected secretary treasurer.

G. W. Ireland, through the reorganization of the office management of the Jamison Coal & Coke Co., became sales manager of the coke department. Richard Donaldson was made manager of the coal department, both offices being formerly handled by the late Mr. Johnson as general sales manager.

Edward I. Martin, of Columbus, Kan., has been appointed receiver for the Pratt-Durkee Coal Co., operating near that city. The receivership was established at the request of officers of the company, who found themselves unable to meet their bi-weekly payroll because of lack of ready funds. The mine will be continued by the receiver for the benefit of creditors.

William Hahman was recently appointed receiver for the Lilly Coal Co. This firm is perfectly solvent having no debts whatever, and the duties of the receiver will be to establish the interests of the company in the properties held by it, to collect all indebtedness due the firm and make proper distribution of the assets among the partners. The receivership was caused by the death of Dr. H. J. Evans, some difficulty arising in the settlement of the interests of the estate of the deceased in the valuable property and assets of the company.

### OBITUARY

J. S. Wiley, a prominent Iowa operator, died at the Red Cross Hospital in Kansas City on Apr. 17. He was 75 years old. Mr. Wiley retired from active business two years ago. Prior to that time he was president of the Marquette Third Vein Coal Co. The body was taken to Davenport, Iowa, for interment.

U. S. Stafford, outside mine foreman of the Consolidation Coal Co., at Chiefton, W. Va., died recently after an illness of a few days. Mr. Stafford was a native of Preston County, belonging to a well-known family in that section of the state. For the past 15 years he has been located at Chiefton, coming there about the time of the opening of the mining plant. He was an experienced man in the mining business, and was one of the valued and trusted employees of his firm. At the time of his death he was 48 years of age, and is survived by his wife and four children.

Stephen Wolschlag, familiarly known to many residents of Peoria, Ill., as "Steve," died there a short time ago in Proctor Hospital. Mr. Wolschlag was 57 years old. He was born in Peoria County, Ill., spending his early youth on a farm and later working in the distilleries. Some 20 years ago he began his career as a coal operator, forming a partnership with James Millard, under the firm name of Millard & Wolschlag. This venture proved a success and 15 years ago he organized the Wolschlag Coöperative Coal Co., which soon became one of the best known coöperative concerns of the state. About a year ago, however, Mr. Wolschlag turned this property over to Ditewig & McElwee, but continued in active management of the mine. In January 1914, he was appointed by Governor Dunne a member of the Illinois Mine Rescue Commission.

### RECENT COAL AND COKE PATENTS

**Soot Blower.** G. P. Brown, Chicago, Ill. 1,086,751, Feb. 10, 1914. Filed Oct. 26, 1911. Serial No. 656,967.

**Mine Car.** J. J. Roby, Cleveland, Ohio. 1,087,318, Feb. 17, 1914. Filed Nov. 15, 1912. Serial No. 731,479.

**Furnace Grate.** W. M. Duncan, Alton, Ill. 1,088,773. Mar. 3, 1914. Filed July 18, 1912. Serial No. 710,140.

**Mechanical Stoker.** W. M. Duncan, Alton, Ill. 1,088,772. Mar. 3, 1914. Filed Apr. 8, 1912. Serial No. 689,214.

**Smoke Burning Device.** F. T. Farnum, Chicago, Ill. 1,087,358, Feb. 17, 1914. Filed May 31, 1913. Serial No. 770,820.

**Mechanical Stoker.** W. R. Wood, London, England. 1,087,155, Feb. 17, 1914. Filed Apr. 28, 1913. Serial No. 764,131.

**Miner's Acetylene Lamp.** U. Daubresse, Novinger, Mo. 1,087,645, Feb. 17, 1914. Filed Apr. 20, 1912. Serial No. 692,052.

**Fuel Feeding Apparatus.** C. D. Stevens, Muskegon, Mich. 1,087,333, Feb. 17, 1914. Filed Nov. 24, 1905. Serial No. 188,945.

**Smoke Preventer.** B. F. B. Fairbrother, Keene, N. H. 1,088,136. Feb. 24, 1914. Filed Feb. 15, 1912. Serial No. 677,758.

**Electric Locomotive.** G. F. Perin, assignor to Jeffrey Mfg. Co., Columbus, Ohio. 1,086,396, Feb. 10, 1914. Filed May 15, 1911. Serial No. 627,241.

**Grate Bar.** G. E. Camp, assignor to International Heater Co., New York, N. Y. 1,089,317. Mar. 3, 1914. Filed Aug. 14, 1912. Serial No. 714,956.

**Smoke-Consuming Device.** D. Townsend, assignor to Cornell Economizer Co., Philadelphia, Penn. 1,088,639. Feb. 24, 1914. Filed Sept. 10, 1908. Serial No. 452,352.

**Device for Signaling the Presence of Explosive Gas Mixtures in Fire Damp Mines.** H. Neubauer, Siebleben, Germany. 1,088,611. Feb. 24, 1914. Filed Feb. 25, 1913. Serial No. 750,571.

### CONSTRUCTION NEWS

**Logan, W. Va.**—The Island Creek Co., recently organized, has secured a lease on about 800 acres, and it is expected that development work will start in the next two or three weeks.

**Andrew, Ill.**—The Roberts & Schaffer Co. recently secured a contract for a Marcus patent coal tippie from the Cora Coal Co. to be installed at Andrew, Ill. This tippie will span five railroad tracks. A similar contract for a like tippie was secured from the Tecumseh Coal Mining Co. to be installed at Bicknell, Ind.

**Wheeling, W. Va.**—The Richland Coal Co. operating near Warwood, anticipates the building of 10 new houses intended



for the accommodation of employees within the next few days. Last year this firm was obliged to erect about 25 new houses. Expansion, however, has made necessary this additional number of dwellings.

**Leavenworth, Kan.**—The work of rebuilding the upper works of the Home mine will begin in the near future. The plant was partly destroyed by fire recently. A reorganization of the Home-Riverside Mining Co., also is to be effected. The mine has been operated by C. N. Fish and P. T. White, the latter of Cleveland, Ohio, as receivers for some time past.

**Cornettsville, Ky.**—The T. C. Seaman Coal Co., recently organized with headquarters at Winchester, Ky., plans the installation of a good-sized coal operation here on the Line Fork tract and the expenditure of several hundred thousand dollars in the development. A five-mile branch line of the Lexington & Eastern is necessary, construction to be started May 1.

**Praise, Ky.**—Track laying on the Carolina, Clinchfield & Ohio R.R. between Elkhorn City, Ky., and Dante, Va., is being rushed with all possible speed. It is said the work will be completed and train service inaugurated over the entire connection within 60 days. This line will form an important connection between the eastern Kentucky coal field and south Atlantic sea-coast cities.

**Hazard, Ky.**—The Hazard Town Coal Co., W. M. Jones, president, Williamsburg, Ky., is now doing the initial work on a coal development one mile from Hazard on the Lexington & Eastern R.R. It will ship from 50 to 75 tons per day from the start and make increases from time to time. Two short-line spur branches of the L. & E. will be necessary and the work has been begun.

**Viper, Ky.**—The Winfrey-Peters Coal Co. here will begin a large coal development on Mason's Creek, three miles from Viper, immediately. The development will consist of the building of a three-mile spur line of the Lexington & Eastern R.R. and the erection of three tipples, several hundred miners' houses, grade work, sawmilling, etc. The lumber necessary is to be manufactured on the ground. C. F. Winfrey is president and will manage the new work.

**Dieder, Penn.**—Excavation and foundation work incident to the erection of 124 additional coke ovens, and the rebuilding of the present 300 ovens of the Lehigh Coke Works, has been started by F. H. Clement & Co., with a force of about 250 men. It is expected that in a short time this force will be increased to about 500 men. The amount involved in the contract given this company is said to run into the hundreds of thousands of dollars, while the work will require at least two years for completion. When this contract is finished, the Lehigh Coke Co. intends to immediately start the construction of 124 other ovens.

## NEW INCORPORATIONS

**Seattle, Wash.**—The Hyde Coal Co. is to increase its capital stock from \$400,000 to \$1,000,000 also to increase the number on the board of trustees from three to five.

**Pikeville, Ky.**—The T. N. Huffman Coal Co. has been organized with a capital stock of \$15,000. The incorporators are T. N. Huffman, Hester A. Huffman and Mary C. Leslie.

**Charleston, W. Va.**—The Michigan & West Virginia Land and Mining Co. has been incorporated with a capital of \$100,000, the purpose being to develop coal and mineral land in W. Va.

**Birmingham, Ala.**—The Canal Export Coal Co. has been organized with a capital stock of \$300,000 to develop 400 acres of coal land. The intention is to mine about 1000 tons of coal daily.

**Fairmont, W. Va.**—The Delmar Coal Co. has been organized with a capital stock of \$25,000. The incorporators are, A. H. Phillips, of Grafton, W. Va., E. S. Phillips, John F. Phillips, Ralph A. Courtney and Clarence D. Robertson, of Fairmont, W. Va.

## INDUSTRIAL NEWS

**Mt. Pulaski, Ill.**—The Mt. Pulaski Colliery Co.'s mine here is to be sold under a court order on May 5.

**Terre Haute, Ind.**—The regular quarterly meeting of the Indiana Fireboss Association was held on Apr. 8, with about 85 per cent. of the membership present.

**Berlin, Germany.**—The Krupp Co. recently purchased the exclusive right to work 60 coalfields on the estate of the Duke of Troy near Duellmen, Austria. The price paid is said to exceed \$5,000,000.

**Youngstown, Ohio.**—The 80 new Koppers byproduct ovens of the Republic Iron & Steel Co. will be put in operation for the first time in a few days. About 200 unskilled workmen are being employed.

**Greenview, Ill.**—Alfred Svenson, a former mine manager and hoisting engineer, is conducting drilling operations with a view to opening a small country mine near this place. He is not, however, sure of finding coal.

**Connellsville, Penn.**—It has been announced that the Consolidation Coal Co. interests in Sommerset County by a contract entered into recently has received orders for the mining during 1914 of 1,140,000 tons of coal, principally for export.

**Columbus, Ohio.**—The Hocking Valley Ry. Co. and the Sunday Creek Co. have asked the U. S. supreme court to review the recent decision of the federal court assessing a fine of \$42,000 against the Hocking Valley Ry. Co. for accepting unsecured notes in payment of prepaid freight charges.

**Birmingham, Ala.**—There is considerable talk here at the present time of a possible merger of the Woodward Iron Co., the Republic Iron & Steel Co., (southern properties), the Sloss-Sheffield Steel & Iron Co. and the Gulf States Steel Co. The heads of these various firms will not, however, discuss the matter.

**Chattanooga, Tenn.**—By an amendment to its charter the John R. Barnes Coal Co. changes its name to the Kentucky-Tennessee Coal Co., and increases its capital stock from \$50,000 to \$100,000. George T. White, H. B. Bonney, W. L. Lawton, J. R. Barnes and W. B. Carvin are the incorporators who filed the amendment.

**Galveston, Texas.**—The Texas City Transportation Co., on Apr. 15, filed suit in the United States District Court, against the Davis Coal & Coke Co., of West Virginia asking damages to the amount of \$40,176.90 on the ground of failure to fulfill a contract for the delivery of 180,000 tons of coal to the plaintiff at the rate of 60,000 tons per year.

**Chicago, Ill.**—The newly formed Chicago section of the American Institute of Mining Engineers held its first annual meeting and dinner on the evening of Apr. 14, at the Sherman House. The officers elected were: Chairman, Robert W. Hunt; Vice-Chairman, J. C. Ede; Secretary-Treasurer, H. W. Nichols; Executive-Committee, F. K. Copeland and G. M. Davidson.

**Springfield, Ill.**—On petition of the Sangamon Loan & Trust Co., the Williamsville Coal Co. located at Selbytown, was recently placed in the hands of a receiver on failure to provide for the payment of \$40,000 worth of bonds. H. J. Linkin was appointed receiver for the company and his bond was placed at \$10,000.

**Peoria, Ill.**—Thomas Fox, Neil Groat, George Green, and Willis McGrew, four Springfield miners, recently purchased the Yocum mine near Lewistown, and will take possession shortly. They plan to place this property in such condition as to increase the output and reduce the cost of operation. Coal will be simply produced for the local market.

**Louisville, Ky.**—During the two weeks ending Apr. 18, the Monongahela River Consolidated Coal & Coke Co. shipped approximately 100,000 tons through the local harbor for New Orleans, leaving coal enough for a month or so in the local harbor, with little in sight in the way of shipments. G. W. Shaw, traffic manager for the company from Louisville to New Orleans, has been in New Orleans and at the various cities between there and Louisville where the company has branches.

**Clarksburgh, W. Va.**—Judge A. G. Dayton in the Federal District Court on Apr. 17, imposed sentences on the striking miners of Colliers, W. Va., for violation of the injunction against interference with employees of the West Virginia & Pittsburgh Coal Co. The men sentenced were guilty of preventing a party of 18 strike breakers from going to work. The sentences imposed ranged from small fines to six months imprisonment.

**Bluefield, W. Va.**—A committee representing the South Carolina Cotton Manufacturers Association recently placed contracts for 350,000 tons of coal with the Blackwood Coal & Coke Co., the Stonega Coal & Coke Co., the Virginia Iron, Coal & Coke Co., and the Black Diamond Coal Co. The competition for the transportation of the coal from the fields of Virginia and Tennessee will fall to the Southern and Chesapeake & Ohio Ry. companies.



# Coal Trade Reviews

## General Review

**Anthracite active but developing signs of weakness. Soft coal restricted without enough demand to absorb the heavily curtailed production. Business confined to negotiations on new contracts. Poor showing in the Lake trade.**

Although the anthracite trade is generally active in all departments, contradictions and crosscurrents are beginning to develop uncertainties in the situation. On the one hand it is noted that mines are working up to full capacity, while most of the companies are refusing to accept further business for April delivery, and it is clear that many April orders will be carried over into the next month, particularly on certain short sizes. On the other hand, careful observers point to distinct indications of weakness in basic conditions, such as less surplus orders than customary during the opening month, a light demand in the lake trade, and a request that shipments be discontinued because of lack of further storage room—a most unusual condition in April. In fact, it is generally agreed that the anthracite trade is beginning to feel the effects of the pressure under which bituminous has been laboring for several months.

The soft-coal business is characterized by an entire absence of any demand while the market is dull and restricted, with business confined to small lots. Consignment coal is still coming in, creating a soft condition in the spot market which the operators are making desperate efforts to maintain in order to avoid a decline in quotations on contract business. Interest is concentrated almost entirely upon this latter phase of the situation, and some agencies that have already lost business by holding out for high figures are now showing a disposition to make concessions. It is generally felt that the bottom of the market has been reached, but there is much uncertainty as to how long it will continue at the low level.

Production in the Pittsburgh district is larger than there is any demand for. Business in Ohio is confined entirely to negotiations on contracts for the new year, there being neither any production or apparent demand for coal, the West Virginia product filling what meager call develops. Indications for the lake business are poor so far, and the first half of the season, at any rate, will witness a light movement. The naval maneuvering out of Hampton Roads and the demonstration against Mexico has resulted in a heavy loading at some of the Atlantic Coast ports, which has been supplemented by a fair movement in the customary coastwise and foreign trade. There are indications of some improvement in the nonunion fields, as a result of the more or less complete cessation of mining in the organized districts. However, the large consumers are standing out determinedly for lower prices, and not much business is being definitely closed.

A few isolated mines are reported working in the Middle Western field, but the demand is so light that even these are compelled to operate under restricted capacity. It is a situation of no coal, and likewise no demand.

## EASTERN MARKET

### BOSTON

**Concessions on Pocahontas and New River for season delivery are slight, but yet have an effect on the trade. Spot market continues quiet. Distributors who guaranteed season prices are apprehensive over the amount of "market coal" coming forward. Anthracite shipments heavy, but stove, broken and screenings are short.**

**Bituminous**—A few more of the mill contracts have been closed the past week, generally at prices that net close to the \$2.35 figure for Pocahontas and New River at Hampton Roads. The "cuts" that have been made on season business so far have been light, but at the same time even slight concessions have their effect on the market. Part of the disposition to shade prices is due to the determination of certain of the agencies to hold business they acquired last year. Some of the contract business offering in February and March was lost to merchants who were in better position to name attractive water rates.

The spot market is still easy and with practically no new developments. Cargoes continue to arrive on consignment and low prices therefore prevail at the distributing points. A large volume of season business was closed early at \$3.80@3.90 f.o.b. Boston, for instance, with a clause guaranteeing the price against a decline, and if spot coal continues to be sold down to \$3.63@3.73 it will be interesting to see whether the distributors who made the early contracts will be obliged to scale down their prices. Were it not for these contracts the spot price would probably be put low enough to discourage shipments "on the market."

The market for the Pennsylvania coals is narrow and restricted. The coastwise trade just now is pretty well confined to small lots loading in conjunction with anthracite, and this almost entirely from Philadelphia. New York consignments are mostly to Long Island Sound and the demand there is light. All-rail trade shows no improvement. The staple varieties are having fair business for so dull a season, but most of the operators are clamoring for orders.

**Anthracite**—Cargoes are coming forward freely and some of the dealers here are rapidly getting to the point where they will have to call a halt on shipments. The retail demand is still exceptional, but a few days of warm weather will put it on a normal basis. Stove size is hard to get and screenings and broken are also in short supply.

Bituminous prices are about as follows:

	Clearfields	Cambrias Somerset	Georges Creek	Pocahontas New River
Mines*	\$0.95@1.50	\$1.25@1.65	\$1.67@1.77	
New York*	2.20@2.75	2.50@2.90	2.92@3.02	
Philadelphia*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.80@2.85
Boston†				3.63@3.78
Providence†				3.55@3.78

\* F.o.b.

† On cars.

### NEW YORK

**Increased activity in anthracite at close of the month. A heavy demand in the line trade. Believed the low point in bituminous has been reached but duration of existing conditions indeterminate. Scarcely any prompt market quotable.**

**Anthracite**—While locally the demand for anthracite coal, particularly the prepared sizes, has not been heavy, the general situation throughout the country has improved materially during the past week or ten days and from the operating end the business is in excellent condition. Contracts are taking full production of broken coal. The general market is absorbing at full circular all of the egg and stove coal, the latter being particularly short. Chestnut is inclined to be dull and inactive and all of the small sizes are in short supply. Some of the companies have already refused to accept further orders on stove coal and have at the same time notified their customers they will not agree to accept any further orders for delivery at the April price. The line demand is heavy and most of the individual coal is being supplied to that trade. The heavy demand for the higher grade steam sizes is subject to comment. While the poorer qualities are available at moderate prices they are moving promptly and with little trouble.

There is a tendency on the part of many of the consumers to shift to bituminous coal or to a mixture of bituminous and No. 2 or No. 3 buckwheat. This mixture is becoming more popular with a large part of the smaller consuming trade while the larger concerns are changing gradually to bituminous entirely.

The dealers around New York have made a set price for April and May and are finding business somewhat dull for April, but appear to be well booked up for May deliveries. It is anticipated that the movement of coal will be heavy for the next month or two at least.

The New York market is now quotable as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	\$4.60	\$4.60	\$4.55	\$4.55
Egg	4.85	4.75@4.85	4.80	4.70@4.80
Stove	4.85	4.85	4.80	4.70@4.80
Chestnut	5.10	5.10	5.05	4.95@5.05
Pea	3.55	3.50@3.60	3.50	3.35@3.50
Buckwheat	2.80	2.80@2.90	2.50@2.75	2.35@2.80
Rice	2.30	2.30@2.40	2.00@2.30	1.80@2.25
Barley	1.80	1.80	1.70	1.40@1.75

**Bituminous**—There has been little or no change in the market on bituminous coal during the past week in spite of the large number of mines idle in the Central Pennsylvania field. There are still many shippers embargoed to Port Reading on account of an over-accumulation. Considerable of this coal is of the cheaper grade from West Virginia, but at the same time some of it comes from the union field, now on suspension, and some from the Pittsburgh district. This is due no doubt to the desire of the shippers to prepare themselves with an extra stock of coal in order to take care of their trade during the suspension. Consumers are well fortified with stocks equivalent to at least four weeks supply and at the same time it is most difficult to make sales on any grade of coal at any price.

While the present situation is probably the most tense we will have to consider for the coming year, it is doubtful if any material increase in demand will develop for the next week or two at least and in any event any increase will likely be very gradual.

It is estimated that about 30% of a normal tonnage is coming from the Central Pennsylvania district, but even those operators still working are finding it most difficult to keep their mines operating on account of the lack of orders. Producers of the better grades are inclined, however, to hold their coal at a moderate price or close down. Coal in the hands of shippers now at the piers and especially the poorer grades is being offered at extremely low figures ranging from \$2.10 f.o.b., up. In addition to this there are several loaded cargoes of poor coal offering at very low prices, but the nominal market continues as follows: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.60@2.70; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

#### PHILADELPHIA

No apparent falling off in demand for anthracite, and trade looks favorable for the next month or six weeks. Many orders and deliveries behind. Conditions in bituminous show no improvement. Volume of business and prices about the same.

**Anthracite**—The closing days of the first month of the new anthracite season, find the trade in a favorable position, and it is not expected that there will be any radical change for the next six weeks. This, of course, applies to the prepared sizes. Already the market for pea coal, influenced by the summer weather, has shown a marked inclination to sag, and it is understood that the surplus is being put into stock; No. 1 buckwheat and rice are still finding a ready market, and with the one exception, all sizes are moving off on orders.

Considerable dissatisfaction is always expressed during April, owing to the inability of the producing companies to supply all the demand at the lowest season's prices. The best distribution possible is made, orders being filled consecutively as entered, but with the demand centered on one or two sizes, it is not possible to satisfy any one. As is always the case, there is a large influx of orders during the closing days of the month, those having the space to store, placing orders with the expectation of saving the ten cents per ton.

	Circular	Individual
Broken.....	\$4.25	\$4.35
Egg.....	4.50	4.50
Stove.....	4.50	4.60 @ 4.70
Chestnut.....	4.75	4.75
Pea.....	3.25	

**Bituminous**—More interest is manifested in the bituminous market. Notwithstanding that fully 75 to 80% of the bituminous operations have suspended the trade does not seem to reflect any abnormal condition. It is evident that the consumers have ample stocks, and are not fearful of being unable to replenish them at other than normal market figures. The general business may be characterized as dull. A slightly better demand was noted early in the week, but the prices realized were those of a week or two past.

#### BALTIMORE

Shipments on contract practically the only business. Price list steady. Anthracite retailers announce spring and summer prices with addition of Pennsylvania state tax.

The trade as a whole is paying little or no attention to the light spot business now being negotiated at unsatisfactory prices, and instead are bending their energies to make the most out of their contracts. The movement on contract is moderately good when general industrial conditions are considered. Considerable coal is moving to Gulf ports, and the shipments to New England are on the increase. Midsummer is expected to find about a normal movement in that direction.

Meanwhile prices remain fairly steady. Spot coals are being held close to the general basis of contracts. West

Virginia fuels are the dullest, three-quarter is selling at the mines at from 80 to 85c. and slack as low as 70 or 75c. Steam fuels from West Virginia are holding well at from 90c. to \$1, low grade Pennsylvania line coals at from \$1 to \$1.15 with the choicer grades around \$1.25, and the best at from \$1.35 to \$1.40.

The retail anthracite circular was announced the past week. It remains the same as last spring with the exception of an addition of 10c. per ton on all grades to cover the assessment of the Pennsylvania tax. The low figure, 40c. off the old fall schedule, will hold until May 31, and will then advance 10c. each month during June, July, August, September and October.

## CENTRAL STATES

#### PITTSBURGH, PENN.

Pittsburgh district mines more than full handed. Production in excess of requirements. Business so light, market prices have scarcely developed. Connellsville coke stagnant, with consumption decreasing.

**Bituminous**—Miners apparently did not understand conditions as to referendum vote on wage scale and many refused to work at first, there being only about 10 mines in Pittsburgh district operating at beginning of last week. But they have since been returning and there were enough men this week to do all work required, which is not much, because of the large stocks and lake season not having opened. Pittsburgh district is this week producing about 40% of the full tonnage. It is understood that counting of referendum vote in this district is completed, but formal announcement has not been made at this writing. A conference will then be arranged for the usual adjustment of various local matters and this will probably be accomplished by end of month.

There has been little demand for coal and sales have been too light to establish a market. It is probable that concessions could be secured in some cases from the regular prices which continue as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in. steam, \$1.50; 1¼-in. domestic, \$1.55, per ton at mine, Pittsburgh district. There have been practically no negotiations for lake coal and shipments by the regular interests are not likely to be of any volume for several weeks.

**Connellsville Coke**—The market has been absolutely stagnant. Some coke is being released through the blowing out of furnaces but operators doubtless intend to restrict production accordingly, for if any coke were forced on the market, prices would undoubtedly suffer. The market is largely nominal, as follows: Prompt furnace, \$1.90@1.95; contract furnace, \$2; prompt foundry, \$2.40@2.50; contract foundry, \$2.40@2.50, per ton at ovens.

#### BUFFALO

No improvement in bituminous market. Slow mining is reducing surplus materially but will take some time yet to affect prices. Coke inactive, but bottom prices appear to have been reached. Anthracite easy when it should be rushing.

**Bituminous**—There is still some coal on track here and elsewhere, but the congestion is slowly disappearing. Dealers say that it will take till May 15 at least to clean up the supply so that consumers will come back into the market as they are much overstocked. Consumption appears to be slower than a year ago and shows no disposition to increase. As a rule the Buffalo trade is paying little attention to the open market. They all have contracts and regular orders as a rule and it is enough for the present to look after them. The difficulty comes from some misguided mine owners dumping coal on this market after failing to sell it elsewhere. It is seldom possible to sell such consignment coal at a profit. The Allegheny Valley miners are practically all idle and they are not expected to resume work again till May. There is no difficulty as a rule, but the men will seldom work when there is a rate agreement pending. This is quite satisfactory to the operators, who say that the prospect is good for resumption sometime next month on exactly old conditions. A good increase in consumption would insure a paying trade, but such is hardly anticipated.

The prices of bituminous are about as weak as they can be, but quotations remain on the former basis of \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run and \$2.25 for slack. The demand for slack is much better than for sizes, but it will ease off as soon as there is more three-quarter made for the lake trade.

The first sailing from this port, on Apr. 16, increased the activity at the docks. The price for three-quarter delivered



on board is \$2.90, the same as last year. Nearly all the coal used in that trade is three-quarter.

**Coke**—There is little demand beyond the regular movement to the furnaces, but the standard ovens refuse to reduce their prices any further. It is said that where a reduction is made it is always on coke that is not of the best. Quotations remain on the basis of \$4.50 for best 72-hr. Connellsville foundry.

**Anthracite**—The trade is good, though April sales will be much smaller than usual. Shippers are not troubled about it, as the prices will be higher next month. Before the end of April they have usually received two or three times the amount of orders that they could fill but this is not the case now and some of them will be practically even with their orders by the opening of May.

Several lake steamers have gone to Ohio ports to load coal for the upper lakes and one or two cargoes will go out soon. The start is slow and it may be sometime before the Sault passage is open. There is never any life to the lake trade till iron ore moves.

#### COLUMBUS

Attention of industry in Ohio concentrated on the coming conference of operators and miners. Little demand for either domestic or steam grades. All mines are still closed.

The coal trade during the past week was quiet in every way. As none of the mines are in operation the production was nil. Operators and jobbers report few inquiries and it appears that there would be little demand at this time even if the mines were in operation.

The coming lake trade is attracting some attention, although the prospects are not bright. While navigation is practically open, no coal will be landed on the docks at the Northwest prior to May 1 when the tax listing is done in the states of Wisconsin and Minnesota. There is still considerable tonnage on the docks and as a result not a great deal of coal will be shipped early in the season. Even were the mines running there would not be much activity in the lake trade before June 1.

Steam demand is light as most of the steam users have a supply on hand for 60 days. Railroads are not using much coal since many of their trains have been discontinued. Domestic trade is about a thing of the past. Dealers have ample stocks for the time being and will not be in the market before the stocking-up period. Some demand is reported for Pocahontas and other fancy grades of domestic fuel. While this is the time for many steam contracts to expire, little is being done toward renewal pending a settlement of the wage agreement. Railroad contracts will be up as soon as the basis of mining is settled.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump....	\$1.45@1.35		\$1.50@1.40	\$1.40@1.35
2-inch.....	1.30@ 1.25	\$1.20@1.15	1.35@ 1.30	1.30@ 1.25
Nut.....	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run.....	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack.	0.90@ 0.85		0.90@ 0.85	0.80@ 0.75
Coarse slack.....	0.80@ 0.75	1.00@ 0.75	0.80@ 0.75	0.70@ 0.65

#### CLEVELAND

Sales for shipment are being taken at prices hardly better than those offered for spot coal. The spot market has cleaned up. Shipping has started to Lake Michigan, but Lake Superior navigation is still closed. Pocahontas operators have pretty well sold up their May and June output of screened coal.

The lowest prices of the year were made last week to clean up soft coal. Youghiogheny slack was sold at \$1.55 and three-quarter Richland, No. 8, brought \$1.85. Fairmount coarse coals were sold at around \$1.95. Very little coal is being carried over the week end, but what is enroute may change the situation for a day or two.

Sales of Fairmount gas for shipment were made the latter part of the week at \$1.90 Cleveland for lump and \$1.80 Cleveland for slack. The orders were not large, but indicate the market is beginning to rid itself of storage coal. It will be another ten days before the true strength of the market can be judged.

Rumors that No. 8 mine-run has been sold on contract at \$1 f.o.b. mines were quite common the last few days. The general tone of the market is toward slightly lower prices on contract coal during 1914 than last year. Little contracting has been done in Ohio coals because of the unsettled labor condition. Those who have been closely following the market report the larger buyers are not in need of as much coal as last year and estimate a lake movement of 21,000,000 to 22,000,000 tons of bituminous coal as compared with 28,000,000 tons in 1913.

Coal has been loaded at all the lake shipping ports during the last week and a few vessels have sailed, but the traffic

will continue light the rest of the month. The Straits of Mackinac have been opened by fish tugs which did not find the ice bothersome. Three boats arrived at Detroit, Mich., Saturday with coal for the Algoma Steel Co. at Sault Ste Marie, Ont., but did not try to proceed until Sunday. The heavy ice in Whitefish Bay at the entrance to Lake Superior is so thick and the extent so great that none of the ships will be able to get through before Apr. 25.

All doubt as to freight rates on the lakes was removed last week when the C. Reiss Coal Co. chartered vessel capacity to transport 2,000,000 tons of bituminous coal to ports on Lakes Michigan and Superior at 30c. It has been customary for the Reiss company to pay less than the Milwaukee rate for coal going to Sheboygan, but the rates this year are too low for a differential. The shippers who were talking a lower rate to Lake Superior ports gave up the idea when the Reiss rate was announced.

Prices of coal for shipment are as follows:

	Pocahontas	Fairmount
Lump.....	\$2.95	\$1.90@1.95
Egg.....	2.95	
Mine run.....	2.60	
Slack.....	2.60	1.80@ 1.85

#### CINCINNATI

Refusal of West Virginia operators to increase wage rate causes alarm in the local market. Dealers have enough supplies on hand to last thirty days. Trade unusually quiet and dull.

Local dealers are greatly concerned over the action of the operators of West Virginia in not only refusing to meet the demand of the miners for a 10% increase, but in seeking to have the men accept a decrease. This action of the operators was brought out at the joint conference in session at Charleston, W. Va., last week. The operators declare they have reached a point where it is better to shut down than to operate at a loss, and figures are quoted showing that since 1902 advances of 40% have been made in the prices of pick mining while the increase in the selling price has been only 8%.

Most of the coal sold in this market is West Virginia mined and the local dealers are fearful that the operators and miners will not come to an amicable understanding. These dealers state they have enough coal on hand to last probably 30 or 60 days if there be no spirited demand, which they say is hardly likely. There has been no perceptible change in the local market during the past week. Trade has been unusually quiet and dull with prices holding firm.

#### TOLEDO

Shutdown of the mines has little effect in the local market. West Virginia grades supplying present demand, which is light. Large tonnages at the local docks for lake shipment.

The feature of the present market is the exceedingly light demand for steam coal. Most of the larger plants are sufficiently stocked to meet immediate requirements. With the cessation of work in the Ohio mines, the trade is finding no difficulty in meeting the meager demand with coal from West Virginia. A great many of the Toledo operators are reporting a fair number of inquiries for contracts.

The docks at Toledo are filled with coal awaiting lake shipment. The first boat for Duluth cleared Wednesday having some surplus stock from the Ohio and Pennsylvania fields, but mostly from the West Virginia regions. Because of the comparatively lower rate in lake shipping, many of the shippers are taking advantage of immediate transportation to the upper lake ports. There is a heavy demand for Pocahontas. One of the largest wholesalers reported having already contracted for all the available Pocahontas up to Aug. 1. Prices on available Ohio and Pennsylvania stock have not changed.

#### DETROIT

Improving tendency but consignment coal still difficult to move. Some activity in contracting. Anthracite in good demand and coming in slowly.

**Bituminous**—While there are some indications of improvement, it is still a fact that jobbers are busy disposing of coal coming in on consignment, the coarse sizes being particularly hard to move, due to the unusually heavy demand for slack. Consumers are now showing a disposition to cover on contracts, a number of which have been recently closed at prices said to be 5 and occasionally even 10c. a ton above last year's level. On the other hand, some unusually low figures are being quoted on track coal, Hocking lump being offered down to \$1.10, as compared with a circular price of \$1.75. On the Pocahontas grade the circular is being generally maintained.

**Anthracite**—Hard coal continues moderately active and strong, particularly on stove and chestnut sizes, which were



practically cleaned up on Apr. 1. There has also been some anxiety on the part of the trade, due to the slow arrivals.

**Coke**—Coke is the most satisfactory branch of the local trade, a large tonnage being moved with comparatively little effort. Connellsville foundry is quoted at \$3, with Semet Solvay at \$3.25 and gas house \$2.90.

#### HAMPTON ROADS

**Fair shipments for the week. Government loadings heavy. No change in prices. Some small movement of high volatile.**

Coal shipments from Hampton Roads piers have been fair some large cargoes moving both coastwise and foreign. Government loadings have also been fairly heavy. While there has been no demand for high volatile coals for spot movement there have been some shipments made during the week for New England. No doubt this coal has moved on contract.

Foreign cargoes have gone to Kingston, Santiago, Daker, Coronel, Valparaiso, Naples, Rio de Janeiro, Genoa, Para, Venice, Manos and Canal Zone.

The largest single cargo of the week went into the U. S. Collier "Nereus" which took approximately 12,500 tons. Prices on all grades remain the same as they have been for some time. On account of light demand on coastwise shipments several schooners have been compelled to lay idle in the Roads waiting for charter.

#### LOUISVILLE

**Effects of suspension being felt and some improvement is noted. Steam sizes becoming short. Cuts in new contracts.**

Suspension of mining operations in the union fields has tended to improve the outlook in this market. Some improvement is noted, especially in the Eastern Kentucky and East Tennessee coals, attributed in part to the labor troubles and also to the opening of the shipping season for coal west-bound from Lake Erie ports. Though the first of April found heavy stocks, May is expected to see large quantities of these depleted.

The steam market continues slow, some dealers finding it necessary to shade prices sharply in order to dispose of such grades on the open market. One agency for a group of Western Kentucky mines has found it necessary to stock up heavily on lump coal in order to get enough nut and slack to fill its steam orders although this is not usual as yet. It is possible that many of the new contracts for steam coal will have to be at a reduced figure. Large consumers are demanding reductions and numbers of large contracts have been renewed at 5c. and even 10c. under the price of a year ago; on the other hand many important contracts have been closed at the same level.

It is necessary frequently to make concessions in both domestic and steam coal to secure a regular amount of business in Louisville. The advent of natural gas has not as yet had any apparent effect on the coal market, though the retail dealers are disturbed as to what may happen next fall and winter. Prices are quoted at from 50c. for pea and slack and 75c. for nut and slack in the Western Kentucky fields to from 65 to 75c. for the best and 40 to 50c. for inferior grades of nut and slack in the Eastern Kentucky fields. Eastern Kentucky block coal to the retail trade is quoted at from \$1.30 to \$1.60 with egg at from \$1 to \$1.30, all f.o.b. the mines.

## SOUTHERN AND MIDDLE-WESTERN

#### BIRMINGHAM

**Dealers delaying placing orders for lump coal. Steam grades still quiet. Tests of Alabama fuels being made in Cuba. Furnace and foundry coke quiet, and blacksmith normal.**

The dealers are still putting off booking lump coal for summer and fall shipment, as has been the usual custom, waiting to see if the operators intend to lower prices as an incentive for larger orders. But it seems to be the opinion that the producers are going to hold to original quotations, as they feel that to make concessions would set a precedent that would have to be repeated every year. Though some few contracts are being let on steam coal, the market is still quiet, and no improvement is looked for until the brick and oil manufacturers contract for their supply, which runs through the summer and fall. However, prices on steam coal remain firm.

One Alabama operator has shipped a large consignment of coal to Cuba, by a specially chartered steamer, having made arrangements with several Cuban manufacturers to make an

exhaustive test of the coal. Should it prove satisfactory, it will mean that a large tonnage will be contracted for. Both furnace and foundry coke are quiet, with practically no sales larger than carload lots. Blacksmith coal is about normal, with no change in price. There is practically no pig iron being sold, though shipments are being made in the normal tonnage; production is not being curtailed to any extent, and no immediate relief is looked for. The car supply is plentiful.

#### NEW ORLEANS

**Anthracite commanding a slight premium, but weakness in other grades is pronounced. Decreases in fuel oil prices affect the market. Marine demand above normal. Alabama waterways soon to be ready for perennial navigation.**

While anthracite is a trifle higher than last year, all grades of bituminous are selling at a decidedly lower level. The mines in Alabama are operating at 50% capacity and there are prospects of further decreases. Much interest is being taken in the contract soon to be let by the American Sugar Refining Co. as it will give an idea as to just how low different companies are prepared to go.

Due to the activity in shipping, as well as the frequent visits of American war vessels stationed in Mexican waters, the demand for coal has been brisk along the harbor front. This has been offset, however, by quietness in the interior, due to the falling price of fuel oil.

High water in the Alabama river system has permitted the transportation of considerable coal by the water route to Mobile and New Orleans. Government engineers, in charge of the work at locks Nos. 2 and 3 on the Tombigbee River, state that the work will be completed earlier than had been expected and perennial navigation will then be assured. Work is being pushed, night and day shifts and Sundays and holidays.

In laying in stocks for this summer, all dealers are taking into consideration the probable increase in the requirements of the bunker trade, following the early opening of the Panama Canal. Several new steamship lines, having this port as their terminus, will begin operation at that time, which will mean that their entire coal supply will come from this port.

#### ST. LOUIS

**Production practically cut off altogether but no buyers are to be found for what small tonnages are offering.**

There is no coal to offer, at least, very little, and with no buyers for even this. At no time was the situation so completely dead as it is at present. A few buyers are showing a little anxiety over the future prospect for screenings and the smaller sizes of coal. Buyers who pay cash for this kind of coal can get it at their own figure, while those asking 30 to 60 days can seldom get the coal.

For the most part the operating mines in the Standard field, that is the fifth and ninth districts are coöperative and must have their money on the fifteenth and thirtieth of every month for coal shipped in the preceding two weeks; hence they must sell to cash customers who consequently, are able to buy the coal at their own figure. Coöperative coal mining means working for less than the regular scale and putting the operator who is paying the scale at a disadvantage.

Standard 2-in. lump coal has been sold as low as 85c., while the screenings are bringing from 75 to 80c. In the Carterville-Franklin County field a few mines are working in isolated places, but even their limit seems to be about two days a week. One Chicago operator, with mines at Marion, Ill., is offering lump and egg at \$1.05 the mines, and a Franklin County producer at West Frankfort is a close second. The better grades of coal from Williamson and Franklin Counties, lump and egg, are bringing from \$1.25 to \$1.45, while No. 1 nut is in some demand. Carterville screenings are good for about 80 to 90c., while in some cases 2-in. screenings are bringing 95c. and \$1. A great many operators seem to figure that there will be no increase in the scale, and are contracting accordingly.

There is a fair tonnage of anthracite moving in, but nothing in the way of coke, and very little smokeless.

The market at the closing of the month was:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump.....	.....	.....	.....	\$0.90 @ 1.00	\$1.15
3-in. lump.....	.....	.....	.....	.....	.....
6-in. lump.....	\$1.35 @ 1.50	.....	1.50	1.10 @ 1.25	1.35
Lump and egg.....	1.85 @ 2.15	\$2.25	.....	.....	1.15
No. 1 nut.....	1.20 @ 1.45	.....	.....	.....	.....
Screenings.....	0.85 @ 0.90	.....	.....	0.65 @ 0.70	0.75 @ 0.80
Mine-run.....	1.10 @ 1.20	.....	.....	0.80 @ 0.85	.....
No. 1 washed nut...	1.50 @ 1.60	2.25	1.50	.....	.....
No. 2 washed nut...	1.25 @ 1.35	.....	1.25	.....	.....
No. 3 washed nut...	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut...	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut...	0.80 @ 0.85	.....	.....	.....	.....

## FOREIGN MARKETS

### GREAT BRITAIN

Apr. 9.—The market is quiet and owing to the holiday influence, business is on a small scale. Quotations are approximately as follows:

Best Welsh steam.....	\$4.50	Best Monmouthshires.....	\$4.11
Best seconds.....	4.38	Seconds.....	3.96
Seconds.....	4.23	Best Cardiff smalls.....	2.82
Best dry coals.....	4.20	Seconds.....	2.70

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, \$6.24; good foundry, \$5.28@5.52; furnace, \$4.32@4.56.

## PRODUCTION AND TRANSPORTATION STATISTICS

### NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February of the current year in short tons.

Pocahontas Field.....	942,477
Tug River District.....	204,074
Thacker District.....	198,228
Kenova District.....	71,401
Clinch Valley District.....	152,769
Other N. & W. Territory.....	3,694

Total N. & W. Fields.....	1,572,643
Williamson & Pond Creek R.R.....	26,314
All other railroads.....	67,518

Grand total.....1,666,475

Following is a comparative statement of the N. & W. tonnage for March, 1913 and 14:

Field	Shipped		Tipple		Total	
	1914	1913	1914	1913	1914	1913
Pocahontas.....	1,055,756	1,003,352	18,137	16,363	1,073,893	1,019,715
Tug River.....	243,546	184,658	2,944	3,169	246,490	187,827
Thacker.....	266,579	238,340	8,207	8,978	274,786	247,318
Kenova.....	79,331	59,345	9,285	7,470	88,616	66,815
Totals.....	1,645,212	1,485,695	38,573	35,980	1,683,785	1,521,675

Shipments of coke, entirely from the Pocahontas field, were 71,620 tons in March of this year as compared with 116,219 last year.

### IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for January, 1912-13-14, and for the seven months ending January, 1912-13-14, in long tons:

Imports from:	7 Months		January	
	1912	1913	1913	1914
United Kingdom.....	5,644	7,218	4,913	1,168
Canada.....	513,569	843,962	579,071	109,520
Japan.....	7,057	30,004	74,306	5,494
Australia and Tasmania.....	143,140	98,308	141,284	10,113
Other countries.....	915	448	1,967	80
Total.....	670,325	979,940	801,541	126,295
Exports:				
Anthracite				
Canada.....	2,034,695	2,812,753	2,242,101	299,977
Uruguay.....			84	
Other countries.....	34,798	50,358	41,677	5,592
Total.....	2,069,493	2,863,111	2,283,862	305,569
Bituminous				
Canada.....	7,079,617	7,002,875	8,516,274	563,196
Panama.....	250,273	269,759	241,054	54,567
Mexico.....	185,302	155,216	182,973	45,778
Cuba.....	638,032	706,776	685,759	117,109
West Indies.....	375,620	329,436	337,271	72,233
Argentina.....			52,861	10,480
Brazil.....			170,521	27,352
Uruguay.....			16,858	
Other countries.....	439,717	563,114	675,118	113,080
Total.....	8,968,561	9,027,176	10,878,629	975,963
Bunker coal.....	3,913,684	4,230,690	4,575,059	612,689

## COAL FREIGHT DECISIONS

I. C. C. No. 5558—Hughes Creek Coal Co., and Kelly's Creek Colliery Co. (No. 5558 Sub.—No. 1) vs. Kanawha & Michigan Ry. Co.

1. Complainants' request for through routes and joint rates between stations on the Kanawha & Michigan Railway and its branches and the points specified in the complaint in eastern and southeastern territory on the lines of the Chesapeake & Ohio and its connections should be granted. As reasonable rates for these routes defendants should apply rates not in excess of those now applying to these destinations for shipments from the mines on the Chesapeake & Ohio. The factor of the two-line haul in the routes sought by complainants is negligible, since the switching connection between the Kanawha & Michigan and the Chesapeake & Ohio is simple, and the average haul to destination is more than 500 miles. Sheridan Chamber of Commerce v. C. & O. R.R. Co., 26 I. C. C., 638, 647-649; Investigation of Alleged Unreasonable Rates on Meats, 23 I. C. C., 656,661. The policy of the Chesapeake & Ohio to restrict the movement of coal on its line confined solely to coal originating on its own line held not to be justified.

2. Complainants' request for a through route and joint rate to the Cincinnati switching territory over the Kanawha & Michigan and the Chesapeake & Ohio and its connections should not be granted. Such a route would give the Kanawha & Michigan a short haul of very much less than the entire length of its line.

3. The fact that the defendants have established through routes and joint rates from Chesapeake & Ohio mines to Kanawha & Michigan destinations while refusing complainants the through routes and joint rates sought does not constitute unlawful discrimination when viewed in the light of the principles applied in Coke Producers Assn. of Connellsville Region v. B. & O. R.R. Co., 27 I. C. C., 125, and the cases there cited, which hold a test of discrimination to be the ability of one of the carriers participating in the two through routes to put an end to the discrimination by its own act.

4. The charge that since the Chesapeake & Ohio and the Kanawha & Michigan are practically one road it is unjustly discriminatory for them to deny the Kanawha & Michigan mines access to markets which have been made available for Chesapeake & Ohio mines held not to be established. For the purposes in question no such identity between the two roads as complainants assert has been proven.

## COAL SECURITIES

The following table gives the range of various active coal securities during the week ending Apr. 18.

Stocks	Week's Range			Year's Range		
	High	Low	Last	High	Low	
American Coal Products.....	83½	83½	83½	86½	83½	
American Coal Products Pref.....	104½	104½	104½	106½	104	
Colorado Fuel & Iron.....	30½	28½	28½	34½	28½	
Colorado Fuel & Iron Pref.....	140	140	140	140	140	
Consolidation Coal of Maryland.....			102½			
Island Creek Coal Com.....	49	48	49			
Island Creek Coal Pref.....	86	85½	85½			
Lehigh Valley Coal Sales.....	170	150	165			
Pittsburgh Coal.....	20½	20	20	23½	17½	
Pittsburgh Coal Pref.....	90½	87½	88½	93½	86	
Pond Creek.....	18	17	17½			
Reading.....	165½	161	161½	172½	161	
Reading 1st Pref.....	88½	88½	88½	89	87½	
Reading 2nd Pref.....	90	90	90	93	90	
Virginia Iron, Coal & Coke.....	46½	45	45	52	40	
Bonds	Week's Range			Year's Range		
	Bid	Asked	Last Sale	High	Low	
Colo. F. & I. gen. s.f.g. 5s.....	97	98½	98	Mar. '14	91½	99
Colo. F. & I. gen. 6s.....	104		107½	June '12	76	82
Col. Ind. 1st & coll. 5s. gu.....		76½	77			
Cons. Ind. Coal Me. 1st 5s.....		74	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s.....		89	89	Mar. '14	89	89
Gr. Riv. Coal & C. 1st g 6s.....		91	99½	Feb. '14	99½	99½
K. & H. C. & C. 1st s f g 5s.....		98½	102½	Apr. '06		
Pocah. Con. Coll. 1st s f 5s.....		90	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s.....		88	88		84	88½
Tenn. Coal gen. 5s.....		77	79½	Mar. '14	77	82
Birm. Div. 1st consol. 6s.....		100½	103	Apr. '14	97½	103½
Tenn. Div. 1st g 6s.....		102	102		101½	103
Cah. C. M. Co. 1st g 6s.....		101½	103	Mar. '14	101	102½
Utah Fuel 1st g 5s.....		101	101½	Mar. '14	101½	101½
Victor Fuel 1st s f 5s.....		75	80	May '13		
Va. I. Coal & Coke 1st g 5s.....		92½	92½		92½	95

### DIVIDENDS

Reading Co.—Regular quarterly of 1% on the first preferred payable June 11 to holders of record May 26.

Burns Bros.—Regular quarterly No. 3 on the common of \$1.25 payable May 15 to holders of record May 1 and regular quarterly No. 5 on the preferred of \$1.75 payable May 1 to holders of record Apr. 15.

Consolidation Coal—Regular quarterly of 1½% payable Apr. 30 to holders of record Apr. 25.

Pacific Coast—Regular quarterly on the first preferred of 1¼% and 1½% on the second preferred; and common, all payable May 1 to holders of record Apr. 25 to May 1.



# Financial Department

## Nova Scotia Steel & Coal Co.

President Robt. E. Harris reports for the year ended Dec. 31, 1913 as follows:

The profits for the year were \$1,255,954, as compared with \$1,000,610 for 1912. Dividends at the rate of 8% on the preferred and 6% on the common stock have been paid quarterly.

The sum of \$32,659 has been applied to the sinking fund for retiring bonds, \$70,185 has been added to the reserve funds, and \$107,682, expended for improvements and betterments, has been written off. The aggregate of these sums is \$210,527, and is considerably in excess of the amount deemed necessary to provide for depreciation.

During the year \$2,000,000 of debenture stock was sold and the proceeds applied in payment of the amounts expended in 1912 and 1913 on capital account. The amount charged to capital account in respect to the expenditure of the past year is \$1,158,462.

The Eastern Car Co. (whose entire issued common stock is held by your company) has been continuously engaged since September in the manufacture of cars, and its operations indicate that it will prove a valuable asset to our shareholders.

Work on the new Jubilee shaft at Sydney Mines has been carried on throughout the year, and it is expected that this colliery will be fully equipped early in the year 1915. An additional open-hearth steel furnace has been erected at Sydney Mines. A large amount of work has been done in further developing our submarine iron ore areas at Wabana and many additions and improvements have been completed during the past year.

### RESULTS FOR CALENDAR YEARS

	1913	1912	1911	1910
Profits for the year.....	\$1,255,954	\$1,000,610	\$1,019,392	\$1,140,504
Balance brought forward..	452,601	508,545	500,603	336,807
Total available.....	\$1,708,555	\$1,509,155	\$1,519,995	\$1,477,311
Interest on bonds, etc....	395,576	352,311	291,169	248,000
Int. on debenture stock...	109,560	60,000	60,000	60,000
Depreciation, renewals...	70,186	92,196	96,124	79,371
Div. on pref. stock (8%)...	82,400	82,400	82,400	82,400
Div. on common stock (6%)	360,000(6%)	360,000(6%)	360,000(4%)	270,000
Dise. etc., on bds. issued..	107,682	61,010	73,881	218,103
Improv'ts and betterm'ts...	55,264	48,637	47,876	18,834
Sinking fund and misc....				
Total.....	\$1,180,668	\$1,056,554	\$1,011,450	\$976,708
Surplus carried forward..	527,887	452,601	508,545	500,603

### BALANCE SHEET DECEMBER 31

	1913	1912	1911	1910
<b>Assets—</b>				
Property and mines.....	\$16,829,073	\$15,670,614	\$14,489,286	\$13,490,554
Inventories.....	1,776,575	1,714,184	1,338,128	1,245,682
Ledger acc'ts and bills rec.	488,161	907,485	590,543	606,857
Cash.....	268,416	328,594	397,289	498,788
Total.....	\$19,362,223	\$18,620,877	\$16,815,247	\$15,841,881
<b>Liabilities—</b>				
Preferred stock.....	\$1,030,000	\$1,030,000	\$1,030,000	\$1,030,000
Common stock.....	6,000,000	6,000,000	6,000,000	6,000,000
Bonds.....	5,911,809	5,946,809	4,933,900	4,960,000
Sinking fund.....	88,278	53,556	26,101	
Debenture stock.....	3,000,000	1,000,000	1,000,000	1,000,000
General reserve.....	750,000	750,000	750,000	750,000
Bills payable.....	200,000	490,000	775,000	
Pay-rolls and acc'ts not due.....	389,930	534,020	440,691	304,597
Fds. cred. East. Car Co....		971,599		
Coupons (January).....	147,795	148,670	125,347	124,000
Coupons not presented...	2,522	1,529	1,540	843
Deb. stock int. Jan. 1....	88,560	30,000	30,000	30,000
Div. on pref. Jan. 15....	20,600	20,600	20,600	20,600
Div. on common Jan. 15..	90,000	90,000	90,000	75,000
Reserve for debr., etc....	1,085,694	1,029,270	1,023,332	994,624
Insurance funds.....	29,153	72,223	62,191	51,614
Profit and loss.....	527,887	452,601	508,545	500,603
Total.....	\$19,362,228	\$18,620,877	\$16,815,247	\$15,841,881

Note:—For the previous annual report of this company see Coal Age Vol. 3, page 284.

## Victor-American Fuel Co.

In the fourth annual report of this company, for the year ending June 30, 1913, Vice-President W. J. Murray says in part:

The net income was \$591,542. After providing for fixed charges and depreciation reserves, a balance of \$257,107 (being \$101,357 less than in 1911-12) was carried to credit of profit and loss. On Nov. 5, 1912, a dividend of 1½% on the capital stock for the six months ending June 30, 1912 was paid, and on June 3, 1913, a further 1½% for the half-year ending Dec. 30, 1912. After making allowances for these dividends and other minor adjustments, the credit balance in profit and loss account Jun 30, 1913, was \$198,513. The decrease in tonnage of coal produced was 73,390 tons; in tonnage of coke, 10,981 tons.

The decrease in surplus income was brought about by a number of causes, mainly of a temporary character. On Apr. 1, 1912, an advance in wages to all mine employees of 10% was put into effect, and on Mar. 5, 1913, in Colorado, and Aug. 1, 1913, in New Mexico, an 8-hr. day was put into effect, causing a reduction of 20% in the hours the mines were operated daily without any corresponding reduction in wages. On most of our steam-coal contracts an equal increase in the price of coal was secured, but the price of domestic coals could only be increased gradually to meet this.

On June 18, 1912, an explosion of gas in the Hastings mine caused the death of twelve miners and a considerable property loss, and greatly curtailed the production of coal throughout the year and increased the cost of the smaller tonnage produced. Unusual expenditures in painting and repair of tenant houses, increase in taxes, payments for personal injuries and reduced dividends from the Western Stores Co. account for fully one-half of the decrease in surplus income.

The Stores Co. suffered a large loss on the volume of business transacted in an effort to check the growing evil of credit sales, but by the close of the year the business had resumed its normal proportions.

During the year there was a great scarcity of mine labor, resulting in a loss of tonnage and an abnormal expense in shipping men into the mining districts. This shortage of mine employees was general throughout the United States and was to some extent occasioned by the large number of Slavs, Greeks, Bulgarians, etc., who returned home during the Balkan War.

The New Mexico mines showed a material increase in earnings, confirming the expectations expressed in the last annual report.

### RESULTS FOR YEARS ENDING JUNE 30

	1912-13	1911-12	1910-11	1909-10
Short Tons				
Coal produced.....	2,155,059	2,228,448	2,256,041	2,358,009
Coal sold.....	2,043,251	2,069,361	2,083,699	2,063,085
Coke produced.....	43,619	54,600	84,943	108,409
Coke sold.....	44,685	52,625	85,213	108,693
Coal purchased and sold..	42,192	6,459	103,353	206,823
Gross earnings.....	\$3,458,169	\$3,457,062	\$3,592,344	\$3,669,070
Operating expenses.....	2,888,602	2,805,471	2,788,625	2,832,720
Net earnings.....	\$569,567	\$651,591	\$803,719	\$836,350
Total net income.....	641,799	739,980	879,610	923,250
<b>Deduct—</b>				
Taxes.....	25,920	20,339	21,597	20,152
Insurance.....	9,135	10,008	10,041	9,312
Miscellaneous.....	23,742	28,256	10,131	9,277
Int. on V.-A. F. bonds...	135,908	127,325	126,000	152,500
Int. on V. F. bonds.....	91,100	92,350	93,550	95,000
Depreciation.....	98,887	103,238	107,603	116,580
Dividends.....	(3) 282,000	(22) 258,500	(5) 470,000	(32) 305,000
Total deductions.....	\$666,692	\$640,016	\$838,922	\$707,821
Bal., sur. or def.....	def 24,893	sur 99,964	sur 40,688	sur 215,429

### BALANCE SHEET JUNE 30

	1913	1912		1913	1912
<b>Assets—</b>			<b>Liabilities—</b>		
Real estate....	\$9,913,003	\$9,850,844	Capital stock.....	\$9,400,000	\$9,400,000
Equipment....	2,918,796	2,691,530	1st and ref. M. 6s.....	2,675,000	2,153,000
West Stores			Victor Fuel		
Co. stock....	210,000	210,000	Co. bds.....	1,822,000	1,847,000
Col. & S.E.			Interest ac-		
RR. stock....	100,000	100,000	crued.....	113,577	100,900
Col. & S.E. Ry.			Bills payable.	175,000	107,900
bds.....	300,000	300,000	Vouch. and		
Mtn. Tel. Co.			pay-rolls...	192,660	161,163
stock.....	15,000	15,000	Taxes acce-		
Bond redem.			unpaid.....	14,000	10,350
accounts....	121,092	71,067	Unpaid cou-		
Development.	204,825	199,485	pons.....	195	505
Advance roy-			Net liability		
alty.....	44,955	42,928	to sub. cos.		
Supplies.....	104,549	100,561	on current		
Cash in banks	130,170	131,977	account....	57,190	50,875
Accounts and			Res. for bond		
bills rec....	389,830	390,900	redem.....	68,110	70,781
Treasury			Disc. on V. F.		
bonds (V.-			Co. bonds		
A.F. Co.)..	226,000	53,000	red.....	851	45
Coal and coke			Profit and loss	\$198,513	268,869
on hand....	5,120	14,314			
Miscellaneous	48,330	10,227			
Total.....	\$14,731,670	\$14,181,832			

\* After deducting losses of \$19,823 for Hastings accident; \$21,465 for general employment and \$9,831 miscellaneous, and adding miscellaneous credits of \$5,673.

Note:—For the previous annual report of this company see Coal Age, Vol. 3 page 474.